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ABSTRACT

This package consists of eight booklets dealing with competency-based vocational education (CBVE). The first booklet is a brochure outlining CBVE in North Dakota. The second booklet, an instructional unit written for vocational education teachers, deals with the characteristics and components of mastery learning and competency-based instruction. Discussed in the third booklet are procedures for reporting learner mastery of tasks in a CBVE program. The remaining five booklets are validated occupational profiles and task listings for the following subject areas as taught in North Dakota CBVE programs: automotive mechanics, carpentry, health occupations, welding, and electronics. (MN)

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COMPETENCY BASED VOCATIONAL EDUCATION

in North Dakota

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What Is It?
Is It For Me?
How Is It Different?
What Are Its Principles?
How Is It Implemented?
Where Can I Go For Help?
How Do I Begin?

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The North Dakota Competency-Based Vocational Education Project
is a co-operative project of the

State Board for Vocational Education
Carrol Burchinal, Director

University of North Dakota
Department of Business and Vocational Education
Dr. James Navara, Chairman

November 1983

CE 041500

WHAT IS IT?

In a nutshell, competency-based instruction in vocational education:

- ...is an instructional system,
- ...aimed at improving the teaching/learning process,
- ...whereby business and industry validated knowledges, attitudes, and skills are specified before instruction takes place,
- ...and where learning is guided by a feedback/correction process.

It is a delivery system that provides a means by which students gain measurable performance competencies, as recognized by business and industry, that will allow them the opportunity to secure gainful employment based on their ability to perform in a worthwhile manner.

Student achievement is based upon demonstrated competency rather than performance measured against other students. They are held accountable for each objective, and may progress at their own rate. Thus, it is possible for instruction to become more individualized.

IS IT FOR ME?

If you believe that an instructional system should:

- ...spell out exactly what is to be learned,
- ...provide high quality instruction,
- ...help students learn one thing well before going on to the next,
- ...require each student to demonstrate competency,

then you believe in competency-based instruction.

On the other hand, if you sincerely believe that:

- ...general statements of student outcomes are sufficient,
- ...lectures and demonstrations are the best approach to instruction,
- ...student evaluation should be based on how well they do compared to other students,

then you won't find the competency-based approach very appealing.

HOW IS IT DIFFERENT?

Many educational practitioners have differentiated between the so-called traditional approach to instruction and the competency-based approach. Charles Losh, Supervisor of Trade, Technical & Health Education at the North Dakota State Board for Vocational Education, sums it up this way:

CRITERIA	TRADITIONAL	COMPETENCY-BASED
Content	Individual Preference, Variable — Content is global and may or may not pertain to performance of a specific task or tasks.	Task based, Fixed — Content is based on knowledge required to perform a specific task or tasks.
Practice Time	Hard to control lab experiences since specific tasks not well defined.	Specific tasks identified — can track performance and allow more or less time depending on student capabilities.
Describing Competency	Standard or criteria of acceptable performance not clear to students. May not be consistent across students. "To instructors satisfaction."	Standard or criteria for identifying competent task performance described for student information, and performance evaluation. "To industry standard."
Grading	Primarily written tests with subjective performance tests.	Combination written, performance, work habits and attitude, objectively defined. Emphasis on developing skilled performance for productivity on the job.
Efficiency	Differentiation between "nice-to-know" and "must know" not always clear. Can lead to wasted time and money, both taxpayer and student.	Since the training is developed around a task or group of tasks, "nice to know" information is minimal thus increasing the emphasis on the "must know." This allows more time for practice, which is the primary determinant of skill level developed.
Effectiveness	Specific requirements for task performance are not always well identified; therefore, training efforts may not produce skilled employees.	The tasks and performance standards required by employers are identified; therefore, the training program is more effective in meeting employers need for skilled employees.
Student Acceptance	Student does not always know what is expected relative to quantity or quality of performance.	Student knows what tasks are to be performed, how well they are to be performed and what they will be able to do upon completion of the course or program.
Employer Support	Employers and advisory committee members not always sure of what goes on in the program and may not feel like they are a contributing force in the school.	Employers and advisory committee members can specifically identify what the program is covering. Through review of the task list they can contribute specific information on their needs.

WHAT ARE ITS PRINCIPLES?

Principle 1
Any student in a training program can master most *any* task at a *high level* of mastery (95-100% proficiency) if provided with *high quality instruction* and *sufficient time.*

Principle 2
A student's *ability* for learning a task need not predict how well the student *learns* the task.

Principle 3
Individual student differences in levels of mastery of a task are more frequently caused by *errors* in the training environment *rather than* by characteristics of the student.

Principle 4
Rather than being *fast* or *slow* learners, or *good* or *poor* learners, most students become very similar to one another in learning *ability, rate* of learning, and motivation for further learning when provided with favorable learning conditions.

Principle 5
We should focus more on differences in *learning* and less on differences in *learners.*

Principle 6
What is worth teaching is worth learning.

Principle 7
The most important element in the teaching/learning process is the *kind* and *quality* of instruction experienced by students.

These seven principles, described by William E. Blank, author of *Handbook for Developing Competency-Based Training Programs*, have been shown to be valid in hundreds of schools around the world. Rather than just theories or speculation, these principles and assumptions are being proven daily in programs where the competency-based approach is being successfully implemented.

HOW IS IT IMPLEMENTED?

The implementation process for a successful competency-based teaching/learning system requires six essential steps:

1. Identify the specific jobs within an occupational area for which training is to be provided.
2. Identify the major job competencies required for each specific job.
3. Identify the common competencies which relate to all of the identified jobs in a given occupational area.
4. Validate the resulting occupational profile by having it reviewed by representatives of the appropriate business or industry.
5. Identify existing competency-based vocational curriculum materials for each of the specific job and common competencies. If none exists for any portion of the occupational profile, convert existing curriculum materials so that it becomes student-centered and student-directed.
6. Develop a management system to plan and monitor each student's progress, assign grades, certify competence, and manage the learning environment.

WHERE CAN I GO FOR HELP?

A major effort to implement competency-based vocational education is under way in the State of North Dakota. A co-operative project between the University of North Dakota and the State Board for Vocational Education has as its stated goal:

> Provide technical assistance for the implementation of competency-based vocational education in secondary and post-secondary institutions in North Dakota.

The Competency-Based Vocational Education Project has been carefully designed to be a valuable resource for those teachers and schools who wish to provide a structured student-centered/student-directed learning environment for their clientele, whether they be secondary students, post-secondary students, or adults.

The Competency-Based Vocational Education Project Director performs six specific tasks:

1. Develop and validate occupational profiles.
2. Seek out mastery-learning/student-centered curriculum materials.
3. Develop mastery-learning/student-centered units of instruction for common or major competency areas where no existing curriculum can be found.
4. In-service educators on the conversion of vocational education instructional programs to the competency-based system.
5. Provide technical assistance to schools desiring to individualize programs through the development of learning activity packets.
6. Provide technical assistance to schools that wish to establish and utilize competency-based vocational education resource rooms and staff.

Responsibility for the direction of the Project is vested in a Management Team, composed of classroom teachers, local directors of vocational education, teacher educators, and State Board supervisors. One of their major tasks is the establishment of *annual* project priorities, including the selection of the occupational areas to be serviced by the Project.

HOW DO I BEGIN?

YOU must start the process. Here's how:

First — a commitment to quality vocational education for your students.

Second — a desire to provide your students with valid job-ready skills.

Third — a realization that the development and management of a competency-based instructional system is going to take time and effort.

Fourth — a willingness to accept assistance and advice from your colleagues who have had success with the system.

Fifth — a determination that you can and will make the system work, acquired habits and biases to the contrary.

And finally — a phone call or letter to the Competency-Based Vocational Education Project Director requesting a visit to your classroom or laboratory:

Director
Competency-Based Vocational Education Project
Capitol Tower, 15th Floor
Bismarck, North Dakota 58505-0177

(701) 224-3195

ND84/3301

INTRODUCING COMPETENCY-BASED VOCATIONAL EDUCATION

UNIT OBJECTIVE

After completion of this unit, the participant should be able to describe the characteristics and components of Mastery Learning and Competency Based Instruction. This knowledge will be evidenced by scoring at least 85% on the Unit Test.

SPECIFIC OBJECTIVES

After completion of this unit, the participant should be able to:

1. Match terms associated with competency-based vocational education to the correct definitions.

2. Select, from a list, eight assumptions about Mastery Learning.

3. Distinguish between characteristics of Mastery Learning and characteristics of traditional learning.

4. Distinguish between statements citing advantages of Mastery Learning and statements critical of Mastery Learning.

5. Arrange, in order, the steps involved in implementing Competency-Based instruction in North Dakota.

DEFINITIONS OF TERMS COMMONLY USED IN COMPETENCY-BASED VOCATIONAL EDUCATION

Affective Objective	An objective dealing with attitude, values, interest, appreciation, and/or social-emotional adjustment.
Behavioral Objective	A statement in measurable terms of what the learner must do or know to master a task and be tested on it. It consists of three parts: (1) the conditions under which the task will be performed (the materials/supplies provided), (2) a description of the task, and (3) the standard for how well the task must be performed.
CBVE Resource Room	A site in a vocational education facility where individualized, self-paced, non-laboratory learning activities such as reading, testing, etc., takes place.
CBVE Resource Staff	Individuals who are responsible for the management of learning activities that take place in a CBVE resource room.
Cognitive Objective	An objective dealing with thinking, knowing, and/or problem solving.
Common Program Competency	A competency that is required of persons employed in more than one of several job titles listed in an occupational profile.
Competency	The level of ability (including knowledges, skills and/or attitudes) to successfully perform specific tasks in order to meet a specified standard.
Competency-Based Instruction	An instructional system aimed at improving the teaching/learning process in which knowledges, attitudes and skills are specified before instruction takes place and where learning is guided by a feedback/correction process.
Competency-Based Vocational Education	See Competency-Based Instruction.
Competency Statement	A precisely worded task statement which communicates a measurable unit of work for which an employer or consumer is willing to pay, including the performance to be learned and what is used or produced.
Competency Validation	A review of identified competencies performed by workers in a given occupation/job by experts in that occupation/job and confirmation by those experts of the importance of the identified competencies.
Competent	A state of being able to perform a task to a predetermined standard.

Core	Groups of instructional elements or units common to all jobs listed in an occupational profile.
Core Competency	See Common Program Competency.
Criterion Referenced Test	An evaluation of student performance or knowledge of a task according to the conditions and standards stated in the performance objective.
Curriculum	The total educational process, including such items as staffing, budget, facilities, and instructional materials.
Delivery System	A predetermined process of imparting planned educational objectives.
Duty	A cluster of related tasks, performed by workers in a specific job title.
Enabling Objective	A statement that specifies a subskill or element of information that must be learned to perform the more complex task described in the performance objective. A series of enabling objectives leads the student step-by-step to mastery of the performance objective.
Entry Level	The state of having mastered the basic competencies necessary to be employable in a specific job.
Evaluation	The act of comparing performance with a predetermined, prestated standard, and passing judgement on the comparison.
Feedback/Correction	An instructional strategy causing the learner to recognize whether a learned practice is accurate or not, and, if not, to steer the learner to further study so the learned practice will be correct.
Individualized Instruction	Learner centered instruction in which the curriculum materials and activites are tailored to meet the needs of the individual.
Instructional Management	The process used in implementing the delivery system.
Job	The duties and tasks performed regularly in one's trade, occupation or profession.
Job Ready Skills	A set of competencies required of a beginning worker in an occupation causing immediate productivity upon entering that occupation.
Job Skill	See Competency
Job Title	A specific occupational classification which is a component of an occupational profile.

Learning Activity Packet (LAP)	An instructional guide written in goal oriented terms which directs a learner through a set of learning activities oriented to a measurable behavior.
Learning Step	A single activity in a Learning Activity Packet which directs the learner to read, study, watch or do something directly related to a measurable behavior.
Lesson Plan	A plan of instruction for a single class meeting which includes instructional objectives, learner activities and teacher activities.
Localizing	Making instructional materials relevant to the community or to the local educational agency.
Major Job Competency	One of a set of validated tasks that must be competency performed to attain entry level in a specific job.
Mastery	The state of having reached competency whereby the individual can perform a task to the industry standard with no additional training.
Mastery Learning	The process of attaining a preset standard of knowledges, concepts, and/or skills whereby a learner receives detailed and immediate feedback so as to achieve a competency before going on to the next.
Motivation	The process of stimulating the need or desire to act.
Occupational Analysis	The process of analyzing or breaking down an occupation into the tasks performed by workers on the job.
Occupational Area	A group of closely related specific job titles.
Occupational Profile	A document resulting from an occupational analysis which lists the name of the instructional program, the common program competencies to be learned, the job titles to which instruction will be addressed, and the tasks to be learned for each job title.
Open Entry/Open Exit	A scheduling approach that allows students to enter, leave or re-enter a program at times in addition to the beginning and ending of the school year.
Performance Objective	See Behavioral Objective.
Program	A cluster of courses or units of instruction that provides training for specified job titles within an occupation.

Program Spin-Off	A level of training at which a learner may opt to exit a program after having mastered the competencies required for employment in one or more specified job titles without having mastered the competencies for all the job titles in an occupational profile.
Psychomotor Objective	An objective dealing with a manipulative or motor skill.
Student Centered/Student Directed Instructional Materials	Instructional materials that: are primarily concerned with learning, not teaching; contain observable and measureable competency statements; are sequential and logical; allow enough time on task to assure mastery; provide for a continuous check on learner progress through a feedback/correction process; promote a high degree of learner motivation.
Task	A measurable element of work from a larger occupational/job activity, usually performed by a single worker in a short span of time.
Task Analysis	The process of analyzing each task identified through occupational analysis to determine the knowledge, attitudes, and skills required of workers in the performance of that task.
Task List	A listing of the identified tasks performed by workers in a given occupation/job.
Terminal Objective	The overall objective of a unit of instruction.
Traditional Instruction	A system of instruction usually characterized by general statements of student outcomes, where lecture and demonstration is the instructional approach used, where students spend about the same amount of time on task, and where student evaluation is based on performance compared to other students.
Unit Objective	See Terminal Objective.
Unit of Instruction	A set of materials used for planning and delivery of instruction. It usually includes performance objectives, suggested activities, information sheets, assignment sheets, visual aids, tests, and answer keys.
Vocational Education	Organized educational programs directly related to the preparation of individuals for employment or for additional preparation for a career requiring other than a baccalaureate or advanced degree.

MASTERY LEARNING

1. Some of the problems that caused concerns among educators in the 50's included the post-war baby boom, Sputnik, and the high school dropout. Among the educational innovations that attempted to address these problems were:
   a. The open education concept whereby students selected what they wished to learn-result:failure
   b. Programmed learning that was self-paced with few or no guidelines-result:failure
2. In the early sixties, Dr. Benjamin Bloom, author of Bloom's Taxonomy of Learning, conducted two studies related to education:
   a. The first was to identify the effects of one-on-one teaching/learning. He concluded that the reason this method was so successful was that there was a continuous check on student progress and the student always knew what was or wasn't important because of the continuous feedback and correction process.
   b. The second study attempted to discover what it was that unsuccessful students did not do. He found that successful students initiated a self review of concepts they had learned, and that they self-directed further study to those concepts they had learned wrongly.
3. As a result of those two studies and other influences, Dr. Bloom developed the concept of Mastery Learning in 1968. He maintained that the use of mastery learning concepts in the classroom would cause 80% of the students to attain a level of success that only 20% of the students could attain with traditional teaching methods
4. Utilization of mastery learning was first attempted on a large scale by City College of Chicago, using a group instruction mode. Student performance showed such dramatic improvement that several other educational agencies soon followed suit. Today, many large school districts use the mastery learning approach. Armed forces educational programs are mostly mastery learning.
5. The technique of mastery learning is grounded in solid research and has been well tested.
6. Assumptions about mastery learning:
   a. Nearly all students can learn most standard school tasks.
   b. Learning, not teaching, should be the primary interest of the school.
   c. The goal of schools is to assure equality of educational outcomes as well as educational opportunities.
   d. Individual difference does not determine the amount of the school curriculum learned.
   e. It is essential that enough time on task be allowed to assure mastery.
   f. Most school learning can be specified in terms of observable and measurable performance.
   g. Learning is sequential or logical.
   h. Student motivation is the key to increasing the quality and quantity of school learning.
7. How effective is mastery learning?
   a. Of 61 studies, 48 indicated statistical significant average achievement results in favor of mastery taught students while none favored non-mastery taught students.
   b. Based on hundreds of mastery learning observations, the following may be concluded:
      1) The higher the percentage of clock time, the higher the mastery level.
      2) Mastery learning is more effective if one clearly defines the required competencies.
      3) Mastery learning students master more objectives during a given time period compared to non-mastery learning students in classrooms where points of demonstrated mastery have been neither defined nor required.

4) Individual learning mastery designs are more effective than group learning mastery designs.
5) Most teachers are easily trained as mastery learning classroom managers.

8. Concerns associated with mastery learning:
   a. Individualized instruction vs. group instruction. Research has shown that individualized mode is better than group mode, but that either mode of mastery learning is better than a traditional, non-mastery mode.
   b. Developmental approaches to mastery learning curriculum:
      1) A fast method is for a curriculum specialist to develop material and distribute it to teachers for use in classrooms.
      2) A better method, although much slower, is for the teacher or groups of teachers to develop material. Advantages include predevelopment & training in the theories and techniques associated with mastery learning, a higher degree of confidence in the material and its utilization, and the liklihood of teachers expanding their own capabilities.
   c. The probability for mastery learning development and use in North Dakota is that there will be some teacher developed materials, some specialist developed material, some group instruction and some individualized instruction.
9. There were three outcomes from regional meetings conducted recently on the subject of competency-based instruction:
   a. The existing educational structure of North Dakota schools be considered when developing and utilizing competency-based vocational education.
   b. Development should be built around available resources that exist in North Dakota.
   c. There should be uniformity of instructional programs across the state so that completion of mastery learning programs means the same in all parts of the North Dakota.
10. Competency-Based Vocational Education has four components:
   a. It is an instructional system,
   b. aimed at improving the teaching-learning process,
   c. whereby job validated knowledge, skills and attitudes are specified before instruction takes place,
   d. and where learning is guided by a feedback/correction process.

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STATEMENTS CITING ADVANTAGES OF MASTERY LEARNING:

1. Tends to encourage cooperative individualism in student learning rather than interpersonal competition resulting in winners and losers.

2. Student attitudes toward learning and toward themselves are enhanced because almost all students achieve success.

3. Provides a favorable learning environment so that students can master the material and become more able in terms of learning ability, rate of learning, and motivation for further learning.

4. Provides for a system of feedback that reveals errors shortly after they occur so that corrections can be made at once.

5. Virtually precludes unearned diplomas.

6. Forces schools to examine curriculum precisely.

7. Encourages teachers to become more motivated to improve their techniques in teaching basic skills.

STATEMENTS CRITICAL OF MASTERY LEARNING:

1. Places responsibility for student performance on the school.

2. Presumes that it is possible and/or desireable to specify all the components that encompass mastery.

3. Implies that repetition of the same material will produce successful performance.

4. Denies the more able student the opportunity to maximize learning.

5. Relies on competency testing to determine student mastery and gives little value to the teacher's professional judgement.

6. Automatically confers equality in scoring and grading.

CBVE PROCESS IN NORTH DAKOTA

A. IDENTIFY OCCUPATIONAL AREA TO BE SERVED

1. Management Team responsibility

2. Annual priorities

B. CONSTRUCT DRAFT OCCUPATIONAL PROFILE

1. Components

a. Occupational area (program)
b. Job titles
c. Common program competencies
d. Major job competencies (Duties)

2. Determine job titles to include in program

a. Job surveys
b. Conversation with industry persons
c. Conversation with program educators

3. Determine major job competencies and common program competencies

a. Review competency lists

A) V-TECS
B) Curriculum laboratories
C) Commercial publishers

b. Select competencies to be included in draft profile

C. CONSTRUCT DRAFT TASK PROFILE

1. Review task lists

a. V-TECS
b. Curriculum laboratories
c. Commercial publishers

2. Select competencies to include in task profile

3. Format task profile to match occupational profile

D. VALIDATE OCCUPATIONAL PROFILE AND TASK PROFILE

1. State Supervisor selects business and industry committee

2. CBVE Project Director arranges validation meeting

3. Business and industry validation committee meets

   a. Reviews draft profiles
   b. Amends draft profiles
   c. Approves draft profiles which are then validated profiles

E. RECOMMEND STUDENT-CENTERED CURRICULUM MATERIALS

1. Search out materials already developed

2. Write units of instruction for areas where none exists

   a. Coordinated by CBVE Project Director
   b. Teachers from program area
   c. Professional writers
   d. Results in student centered units of instruction

F. IN-SERVICE TEACHERS IN PROGRAM AREA

1. Mastery learning

2. Curriculum development

3. Writing a unit of instruction

4. Teaching a unit of instruction

5. Individualized instruction

   a. Construct learning activity packets
   b. Utilize resource rooms and resource people

G. COMPETENCY-BASED INSTRUCTION TAKES PLACE IN CLASSROOMS

H. EVALUATE RESULTS OF INSTRUCTION AND REFINE METHODS AND MATERIALS

ASSUMPTIONS ABOUT MASTERY LEARNING

1) NEARLY ALL STUDENTS CAN LEARN MOST STANDARD SCHOOL TASKS.

2) LEARNING, NOT TEACHING, SHOULD BE THE PRIMARY INTEREST OF THE SCHOOL.

3) THE GOAL OF SCHOOLS IS TO ASSURE EQUALITY OF EDUCATIONAL OUTCOMES AS WELL AS EQUALITY OF EDUCATIONAL OPPORTUNITIES.

4) INDIVIDUAL DIFFERENCE DOES NOT DETERMINE THE AMOUNT OF THE SCHOOL CURRICULUM LEARNED.

5) IT IS ESSENTIAL THAT ENOUGH TIME ON TASK BE ALLOWED TO ASSURE MASTERY.

6) MOST SCHOOL LEARNING CAN BE SPECIFIED IN TERMS OF OBSERVABLE AND MEASURABLE PERFORMANCE.

7) LEARNING IS SEQUENTIAL OR LOGICAL.

8) STUDENT MOTIVATION IS THE KEY TO INCREASING THE QUALITY AND QUANTITY OF SCHOOL LEARNING.

HOW EFFECTIVE IS MASTERY LEARNING

1) OF 61 STUDIES, 48 INDICATED STATISTICAL SIGNIFICANT AVERAGE ACHIEVEMENT RESULTS IN FAVOR OF MASTERY TAUGHT STUDENTS WHILE NONE FAVORED NON-MASTERY TAUGHT STUDENTS.

2) BASED ON HUNDREDS OF MASTERY LEARNING, THE FOLLOWING OBSERVATIONS WERE MADE:

   -- THE HIGHER THE PERCENTAGE OF CLOCK TIME, THE HIGHER THE MASTER LEVEL.

   -- MASTERY LEARNING IS MORE EFFECTIVE IF ONE CLEARLY DEFINES THE REQUIRED COMPETENCIES.

   -- MASTERY LEARNING STUDENTS MASTER MORE OBJECTIVES DURING A GIVEN TIME PERIOD COMPARED TO NON-MASTERY LEARNING CLASSROOMS WHO HAVE NEITHER DEFINED NOR REQUIRED POINTS OF DEMONSTRATED MASTERY.

   -- INDIVIDUALIZED LEARNING MASTERY DESIGNS ARE MORE EFFECTIVE THAN GROUP MASTERY LEARNING.

   -- MOST TEACHERS ARE EASILY TRAINED AS MASTERY LEARNING CLASSROOM MANAGERS.

COMPONENTS

COMPETENCY BASED INSTRUCTION...

...IS AN INSTRUCTIONAL SYSTEM,

...AIMED AT IMPROVING THE TEACHING-LEARNING PROCESS,

...WHEREBY JOB VALIDATED KNOWLEDGES, SKILLS AND ATTITUDES ARE SPECIFIED BEFORE INSTRUCTION TAKES PLACE,

...AND WHERE LEARNING IS GUIDED BY A FEEDBACK/CORRECTION PROCESS.

ADVANTAGES

1) It tends to encourage cooperative individualism in student learning rather than interpersonal competition resulting in winners and losers.

2) Student attitudes toward learning and toward themselves are enhanced because most all students achieve success.

3) It provides a favorable learning condition so that students can master the material and become more able in terms of learning ability, rate of learning, and motivation for further learning.

4) Provides for a system of feedback that can reveal errors shortly after they occur whereby corrections are then made.

5) It virtually precludes unearned diplomas.

6) Forces schools to examine curriculum precisely. (institutes a system of quality control)

7) Encourages teachers to become more motivated to improve their techniques in teaching basic skills.

CRITICISMS OF MASTERY LEARNING

1) IT PLACES RESPONSIBILITY FOR STUDENT PERFORMANCE ON THE SCHOOL.

2) IT PRESUMES THAT IT IS POSSIBLE AND/OR DESIRABLE TO SPECIFY ALL THE COMPONENTS THAT ENCOMPASS MASTERY.

3) IT IMPLIES THAT REPETITION OF THE SAME MATERIAL WILL PRODUCE SUCCESSFUL PERFORMANCE.

4) IT DENIES THE MORE ABLE STUDENT THE OPPORTUNITY TO MAXIMIZE LEARNING.

5) IT RELIES ON COMPETENCY TESTING TO DETERMINE IF THE STUDENT HAS MASTERED THE MATERIAL AND GIVES LITTLE VALUE TO THE TEACHER'S PROFESSIONAL JUDGEMENT.

6) IT AUTOMATICALLY CONFERS EQUALITY IN SCORING AND GRADING.

NAME _____

INTRODUCING COMPETENCY-BASED VOCATIONAL EDUCATION

TEST

1. Match the terms on the right to the correct definitions.

_____1. The process of attaining a preset standard of knowledges, concepts, and/or skills whereby a learner receives detailed and immediate feedback so as to achieve a competency before going on to the next.

_____2. A document resulting from an occupational analysis which lists the name of the instructional program, the common program competencies to be learned, the job titles to which instruction will be addressed, and the tasks to be learned for each job title.

_____3. A measurable element of work from a larger occupational/job activity, usually performed by a single worker in a short span of time.

_____4. Instructional materials that: are primarily concerned with learning, not teaching; contain observable and measureable competency statements; are sequential and logical; allow enough time on task to assure mastery; provide for a continuous check on learner progress through a feedback/correction process; promote a high degree of learner motivation.

_____5. An instructional system aimed at improving the teaching/learning process in which knowledges, attitudes and skills are specified before instruction takes place and where learning is guided by a feedback/correction process.

_____6. The level of ability (including knowledges, skills and/or attitudes) to successfully perform specific tasks in order to meet a specified standard.

_____7. A state of being able to perform a task to a predetermined standard.

_____8. The state of having reached competency whereby the individual can perform a task to the industry standard with no additional training.

_____9. An instructional strategy causing the learner to recognize whether a learned practice is accurate or not, and, if not, to steer the learner to further study so the learned practice will be correct.

a. Competency
b. Competency-Based Vocational Education
c. Competent
d. Feedback/correction
e. Mastery
f. Mastery Learning
g. Occupational Profile
h. Student Centered/ Student Directed Instructional Materials
i. Task

NAME_____

2. Certain assumptions may be made about Mastery Learning. From the list below, mark an X in the blank preceeding each correct assumption statement.

_____a. Learning is sequential or logical.
_____b. Teaching should be the primary interest of the school.
_____c. Student motivation is the key to increasing learning.
_____d. Course content is global.
_____e. Nearly all students can learn most standard school tasks.
_____f. Most learning can be specified in terms of measurable performance.
_____g. It is essential that enough time on task be allowed to assure mastery.
_____h. Individual difference does not determine the amount of the school curriculum learned.
_____i. Learning should be the primary interest of the school.
_____j. The goal of the school is to assure equality of educational outcomes as well as educational opportunities.
_____k. Subjective performance testing measures mastery.

3. If the statement generally describes Traditional approach to learning, write T in the blank. If the statement describes Competency-Based approach to learning, write C in the blank.

_____1. Content is task-based.
_____2. Specific tasks identified.
_____3. To instructor's satisfaction.
_____4. Primarily written tests.
_____5. "nice to know" and "must know" may not be differentiated.
_____6. Performance standards identified
_____7. Student knows tasks to be performed.
_____8. Employers review task lists.

4. If the statement is critical of Mastery Learning, write C in the blank. If the statement cites an advantage of Mastery Learning, write A in the blank.

_____1. Places responsibility for student performance on the school.
_____2. Presumes that it is possible and/or desireable to specify all the components that encompass mastery.
_____3. Tends to encourage cooperative individualism in student learning rather than interpersonal competition resulting in winners and losers.
_____4. Implies that repetition of the same material will produce successful performance.
_____5. Denies the more able student the opportunity to maximize learning.
_____6. Student attitudes toward learning and toward themselves are enhanced because almost all students achieve success.
_____7. Provides a favorable learning environment so that students can master the material and become more able in terms of learning ability, rate of learning, and motivation for further learning.
_____8. Provides for a system of feedback that reveals errors shortly after they occur so that corrections can be made at once.
_____9. Virtually precludes unearned diplomas.
_____10. Relies on competency testing to determine student mastery and gives little value to the teacher's professional judgement.
_____11. Automatically confers equality in scoring and grading.
_____12. Forces schools to examine curriculum precisely.
_____13. Encourages teachers to become more motivated to improve their techniques in teaching basic skills.

NAME_____

5. Arrange the eight statements so they describe, in order, the steps involved in implementing Competency-Based instruction in North Dakota by writing the numbers 1 through 8 in the blanks.

_____ Construct Draft Task Profile

_____ Competency-Based Instruction Takes Place

_____ Validate Occupational Profile and Task Profile

_____ Identify Occupational Area to be Served

_____ Construct Draft Occupational Profile

_____ In-Service Teachers in Program Area

_____ Recommend Student Centered Curriculum Materials

_____ Evaluate Results of Instruction and Refine Methods and Materials

Answers to Test

1.

f	1
g	2
i	3
h	4
b	5
a	6
c	7
e	8
d	9

2.

x	a
	b
x	c
	d
x	e
x	f
x	g
x	h
x	i
x	j
	k

3.

C	1
C	2
T	3
T	4
T	5
C	6
C	7
C	8

4.

C	1
C	2
A	3
C	4
C	5
A	6
A	7
A	8
A	9
C	10
C	11
A	12
A	13

5.

3
7
4
1
2
6
5
8

ND 84132 01

REPORTING
LEARNER MASTERY OF TASKS
IN A CBVE PROGRAM

COMPETENCY BASED VOCATIONAL EDUCATION

a cooperative project of

NORTH DAKOTA STATE BOARD FOR VOCATIONAL EDUCATION
CARROL BURCHINAL, DIRECTOR

AND

BUSINESS AND VOCATIONAL EDUCATION, UNIVERSITY OF NORTH DAKOTA
JAMES L. NAVARA, CHAIRMAN

REPORTING LEARNER MASTERY OF TASKS IN A CBVE PROGRAM

As schools in North Dakota adopt mastery learning, competency-based education in instructional programs, reporting learner mastery of business and industry validated tasks become a concern of many educators.

The Competency-Based Vocational Education Project, a joint venture of the State Board for Vocational Education and the University of North Dakota, has addressed that concern.

Four criteria for the reporting system were identified:

1. utilize a microcomputer system readily available in most schools,
2. relatively inexpensive,
3. relatively easy to use, and
4. able to generate a hard copy report showing only those tasks the learner has mastered.

Much of the preliminary work was done by Mark Freier of Lake Region Community College. With his suggestions as a base, the CBVE Project has formulated the following procedure to report mastered competencies:

1. Gain access to the following:
   A. Apple IIe computer with monitor, 80 column card, printer, and at least one disk drive (two drives are preferred)
   B. PFS:WRITE software package
   C. Several blank diskettes
   D. A copy of the **Master Task List Diskette.**
      a. This can be obtained by sending a blank 5 1/4" single-sided, double density, soft sector diskette to:
         CBVE Project
         15th Floor, Capitol Tower
         Bismarck, ND 58505
      b. Validated task lists are available for:
         1. Auto Mechanics
         2. Building Trades
         3. Electronics
         4. Health Occupations
         5. Welding
      c. Soon to be available are:
         1. Marketing and Distributive Education
         2. Office Education
      d. More will become available as the CBVE Project addresses other vocational curriculum areas.

2. Study the PFS:WRITE User's Manual.

3. Using PFS:WRITE, display the Master Task List for the curriculum area to be amended and reported by using the "get" command. All Master Task Lists are on the same diskette. Document names are:

Auto Mechanics	AUTOMECH
Building Trades	BUILD
Electronics	ELEC
Health Occupations	HEALTH
Welding	WELD

4. Remove the Master Task List diskette from drive 2 and replace it with a blank diskette. This will become the Amended Text diskette and will be used to generate all learner mastery reports for that curriculum area.

5. Change the name and address of the school or institution at the beginning of the task list to your own school name. Center each line and boldface the top line, which is the name of the school.

6. "Save" the change to the Amended Text diskette in drive 2, naming the document as in step 3.

7. Make a backup copy of the Amended Test diskette using the RUN COPYA command from the DOS System Master diskette, which comes with the Apple IIe computer.

8. Using PFS:WRITE and the Amended Text diskette, run a hard copy of the Master Task List for each learner for whom you wish to generate a report. (The second and subsequent copies may be made on the microcomputer or on a photocopy machine)

9. On the hard copy for each learner for whom a report is to be generated, the instructor will write:
   A. the learner's name
   B. the instructor's name
   C. the current date
   E. an X to the left of each task the learner has mastered. If any tasks are mastered following a duty (in boldface), put an X to the left of that duty also.

10. Using PFS:WRITE and the Amended Text diskette, "get" the Task List to the monitor display.

11. Remove the diskette from drive 2.

12. Using the hard copy prepared in step 6 above as a guide, edit the display:
    A. erase underlines showing where to enter names and dates
    B. enter learner's name, boldface and center the line
    C. enter instructor's name, boldface and center the line
    D. enter the date; boldface the day, month and year and center the line
    E. erase all lines NOT preceded by an X.

13. The display on the monitor should now show the report exactly as it will appear on a printout.

14. Press "Esc."

15. "Print" the report.

16. Repeat steps 9-15 for each learner for whom you wish to generate a report.

17. Keep the hard copy of the report for each learner (step 9) so that later updates of mastered tasks may be more easily entered and generated.

NORTH VALLEY VOCATIONAL CENTER

RR #1

Grafton, North Dakota 58237

BUILDING TRADES COMPETENCIES

listed in this report have been mastered by

_____

This report was prepared by

_____

Building Trades Instructor

on this _____ day of _____,_____

I. COMPETENCIES COMMON TO ALL JOB TITLES IN THIS PROGRAM

Apply for a Job
- Write a letter of application for a job
- Make an appointment by telephone for an interview
- Write a resume
- Complete an application for a job
- Write a follow-up letter after an interview
- Complete a social security application
- Interview for a job

Practice Safety
- List safety rules to abide by in housekeeping, fire, electrical, first aid, hand tools, machines, and shop policies
- Identify components of a fire triangle
- Demonstrate personal safety
- Demonstrate general shop safety
- Demonstrate general safety precautions
- Demonstrate the ability to keep a clean, orderly and safe work area
- Demonstate proficiency in first aid

Use Basic Mathematics
- Add and subtract decimals
- Add and subtract fractions
- Convert fractions to decimals
- Convert decimals to fractions
- Convert feet to inches and inches to feet
- Calculate volume
- Calculate area

STEP 3 SAMPLE

First page of a Program Task List as it is printed from the Master Task List Diskette

NORTH VALLEY VOCATIONAL CENTER

RR #1

Grafton, North Dakota 58237

BUILDING TRADES COMPETENCIES

listed in this report have been mastered by

VICKI FLANDERS

This report was prepared by

GORDY STARK

Building Trades Instructor

on this 25th day of MAY, 1985

STEP 9 SAMPLE

Same page as preceding with Learner's Name, Instructor's Name, Date, and Mastered Tasks penciled In.

×I. COMPETENCIES COMMON TO ALL JOB TITLES IN THIS PROGRAM

- ×Apply for a Job
  - ×Write a letter of application for a job
  - ×Make an appointment by telephone for an interview
  - ×Write a resume
  - ×Complete an application for a job
  - ×Write a follow-up letter after an interview
  - Complete a social security application
  - ×Interview for a job
- × Practice Safety
  - ×List safety rules to abide by in housekeeping, fire, electrical, first aid, hand tools, machines, and shop policies
  - ×Identify components of a fire triangle
  - × Demonstrate personal safety
  - × Demonstrate general shop safety
  - × Demonstrate general safety precautions
  - Demonstrate the ability to keep a clean, orderly and safe work area
  - Demonstate proficiency in first aid
- × Use Basic Mathematics
  - × Add and subtract decimals
  - Add and subtract fractions
  - Convert fractions to decimals
  - Convert decimals to fractions
  - × Convert feet to inches and inches to feet
  - × Calculate volume
  - × Calculate area

NORTH VALLEY VOCATIONAL CENTER

RR #1

Grafton, North Dakota 58237

BUILDING TRADES COMPETENCIES

listed in this report have been mastered by

VICKI FLANDERS

This report was prepared by

GORDY STARK

Building Trades Instructor

on this 25th day of May, 1985

STEP 15 SAMPLE

Same page as preceding as it is generated from the Microcomputer Printer.

THIS IS THE REPORT OF MASTERED COMPETENCIES

I. COMPETENCIES COMMON TO ALL JOB TITLES IN THIS PROGRAM

Apply for a Job
- Write a letter of application for a job
- Make an appointment by telephone for an interview
- Write a resume
- Complete an application for a job
- Write a follow-up letter after an interview
- Interview for a job

Practice Safety
- List safety rules to abide by in housekeeping, fire, electrical, first aid, hand tools, machines, and shop policies
- Identify components of a fire triangle
- Demonstrate personal safety
- Demonstrate general shop safety
- Demonstrate general safety precautions

Use Basic Mathematics
- Add and subtract decimals
- Convert feet to inches and inches to feet
- Calculate volume
- Calculate area

NORTH DAKOTA

VALIDATED

OCCUPATIONAL PROFILE

AND

TASK LISTING

Automotive

Competency-Based Vocational Education

A Cooperative Project of

NORTH DAKOTA STATE BOARD FOR VOCATIONAL EDUCATION
CARROL BURCHINAL, DIRECTOR

AND

BUSINESS AND VOCATIONAL EDUCATION, UNIVERSITY OF NORTH DAKOTA
JAMES L. NAVARA, CHAIRMAN

OCCUPATIONAL PROFILE

VALIDATED COMPETENCIES

PROGRAM AUTOMOTIVE MECHANICS

3/84

I. COMPETENCIES COMMON TO ALL JOB TITLES IN THIS PROGRAM	A. Apply For A Job B. Practice Safety C. Use Hand Tools D. Operate an Arc Welder E. Operate Oxy-Acetylene Equipment F. Use Precision Tools

JOB TITLE	II. Engine Performance Technician	III. Automotive Electrical Technician	IV. Engine Repair Technician	V. Drive Train Technician	VI. Brake Technician	VII. Alignment Technician
MAJOR JOB COMPETENCIES	A. Diagnose Engine Performance Problems B. Service Ignition System C. Service Fuel System D. Service Emissions Control System	A. Service Engine Electrical System B. Service Body Electrical System C. Service Heating & Air Conditioning System	A. Diagnose Engine Problems B. Service Engine Block C. Service Cylinder Head and Valve Train D. Service Cooling System E. Service Exhaust System	A. Service Manual Transmission B. Service Drive Lines C. Service Automatic Transmissions	A. Service Brake System	A. Service Suspension System B. Service Steering System

AUTOMOTIVE MECHANICS

Number of Tasks Performed by Practioners and Number of Tasks Designated Entry Level as Validated by the Industry Task Committee Meeting in Bismarck, ND - March 16, 1984	No. of Tasks Performed by Practicioners	No. of Task Designated Entry Level
I. COMPETENCIES COMMON TO ALL JOB TITLES IN THIS PROGRAM	36	36
A. Apply for a Job	2	2
B. Practice Safety	6	6
C. Use Hand Tools	14	14
D. Operate an Arc Welder	3	3
E. Operate Oxy-Acetylene Equipment	5	5
F. Use Precision Tools	6	6
II. ENGINE PERFORMANCE TECHNICIAN	112	95
A. Diagnose Engine Performance Problems	16	16
B. Service Ignition System	30	29
C. Service Fuel System	40	24
D. Service Emissions Control System	26	26
III. AUTOMOTIVE ELECTRICAL TECHNICIAN	116	79
A. Service Engine Electrical System	20	20
B. Service Body Electrical System	55	38
C. Service Heating and Air Conditioning System	41	21
IV. ENGINE REPAIR TECHNICIAN	61	52
A. Diagnose Engine Problems	8	8
B. Service Engine Block	14	7
C. Service Cylinder Head and Valve Train	11	10
D. Service Cooling System	20	20
E. Service Exhaust System	8	7
V. DRIVE TRAIN TECHNICIAN	73	27
A. Service Manual Transmission	22	6
B. Service Drive Lines	26	13
C. Service Automatic Transmissions	25	8
VI. BRAKE TECHNICIAN	32	25
A. Service Brake System	32	25
VII. ALIGNMENT TECHNICIAN	55	19
A. Service Suspension System	19	8
B. Service Steering System	36	11
TOTAL	485	333

AUTOMOTIVE MECHANICS
VALIDATED COMPETENCIES

After completing this course of study, the student will be able to:

I. COMPETENCIES COMMON TO ALL JOB TITLES IN THIS PROGRAM

A. Apply for a Job

1. Make an appointment by telephone for an interview.
2. Complete an application for a job.

B. Practice Safety

1. List safety rules to abide by in housekeeping, fire, electrical, first aid, hand tools, machines, and shop policies.
2. Identify components of a fire triangle.
3. Demonstrate personal safety
4. Demonstrate general shop safety
5. Demonstrate general safety precautions
6. Demonstrate the ability to keep a clean, orderly, and safe work area

C. Use Hand Tools

1. Sharpen a twist drill.
2. Drill holes with a drill press.
3. Reshape a cold chisel.
4. Dress a grinding wheel.
5. Check a torque wrench for accuracy.
6. Draw file a flat surface.
7. Draw a twist drill hole to correct center.
8. Fit a helicoil to a hole.
9. Tap a hole.
10. Use a die.
11. Use a reamer.
12. Measure with steel rules.
13. Operate pneumatic wrench.
14. Operate pneumatic cutting tools.

D. Operate an Arc Welder

1. Start, stop, and restart a bead.
2. Construct a pad weld.
3. Construct a butt weld.

E. Operate Oxy-Acetylene Equipment

1. Make ninety-degree cuts on mild steel and restart a cut.
2. Cut round stock.
3. Cut a hole.
4. Weld butt joints with filler rod.
5. Braze weld.

F. Use Precision Tools

1. Use plain micrometer.
2. Use vernier micrometer.
3. Use inside micrometer.
4. Use inside caliper.
5. Use outside caliper.
6. Use dial indicator.

II. ENGINE PERFORMANCE TECHNICIAN

A. Diagnose Engine Performance Problems

1. Identify cause of engine run-on dieseling.
2. Identify cause of detonation/pre-ignition.
3. Identify cause of stalling/rough idle when engine is cold.
4. Identify cause of stalling or rough idle before engine reaches operating temperature.
5. Identify cause of stalling/rough idle when engine is at normal operating temperature.
6. Identify cause of engine stumble on acceleration.
7. Identify cause of steady throttle surge.
8. Identify cause of sluggish acceleration.
9. Identify cause of intermittent cutting out.
10. Identify cause of excessive fuel consumption.
11. Identify cause of "hard-starting" engine.
12. Identify cause of "non-starting" engine.
13. Identify cause of engine miss.
14. Identify cause of excessive black exhaust smoke-diesel.
15. Identify cause of excessive white exhaust smoke-diesel.
16. Identify cause of excessive detonation engine noise while running-diesel.

B. Service Ignition System

1. Remove and replace spark plug wires.
2. Remove and replace spark plugs.
3. Clean spark plugs.
4. Gap spark plugs.
5. Test ignition system using engine analyzer.
6. Test point dwell.
7. Remove and replace distributor cap.
8. Remove and replace distributor rotor.
9. Inspect distributor for worn parts.
10. Remove and replace points.
11. Remove and replace condensor.
12. Test condensor.
13. Remove and replace distributor.
14. Test distributor module (electronic).
15. Remove and replace distributor module (electronic).
16. Test pickup coil (electronic).
17. Remove and replace pickup coil (electronic).
18. Test automatic spark advance mechanism.
19. Remove and replace automatic spark advance mechanism.
20. Adjust point dwell.

21. Test ignition timing.
22. Adjust ignition timing.
23. Test ignition coil.
24. Test primary circuit resistance.
25. Test secondary circuit continuity.
26. Test spark plug wires resistance.
27. Test glow plug electrical system.
28. Test glow plug.
29. Remove and replace glow plug.

C. Service Fuel System

1. Check air cleaner element.
2. Remove and replace fuel filter element.
3. Adjust anti-stall device.
4. Inspect carburator linkage for binding and worn parts.
5. Check carburator for vacuum leaks.
6. Remove and replace air cleaner.
7. Adjust automatic choke.
8. Test heat riser manifold valve system.
9. Free up manifold heat riser valve.
10. Remove and replace manifold heat riser valve.
11. Clean heat riser passages.
12. Test fuel pump.
13. Remove and replace fuel pump.
14. Remove and replace fuel lines.
15. Remove and replace gas tank.
16. Inspect fuel pickup tube and filter.
17. Remove and replace fuel pickup tube and filter.
18. Test carburator adjustment using infra-red tester.
19. Adjust carburator idle mixture.
20. Clean automatic choke.
21. Adjust float.
22. Adjust carburetor metering rods.
23. Remove and replace carburetor metering jets.
24. Remove and replace carburetor.

D. Service Emissions Control System

1. Test emission control system using infra-red tester.
2. Remove and replace vacuum hoses.
3. Test P.C.V. System.
4. Remove and replace P.C.V. valve.
5. Remove and replace P.C.V. valve hose(s).
6. Test vacuum advance/retard device.
7. Remove and replace vacuum advance/retard device.
8. Test electrical advance/retard device.
9. Check idle solenoid.
10. Remove and replace idle solenoid.
11. Remove and replace deceleration valve.
12. Test thermostatic air cleaner.
13. Adjust thermostatic air cleaner.
14. Remove and replace thermostatic air cleaner.
15. Check exhaust gas recirculation valve operation.

16. Check air injection system.
17. Remove and replace air pump.
18. Remove and replace closed system charcoal cannister filter.
19. Test back pressure of exhaust system.
20. Remove and replace catalytic converter.
21. Remove and replace exhaust gas recirculation valve.
22. Remove and replace diverter and anti-backfire valve.
23. Test fuel evaporation system.
24. Test exhaust oxygen sensor.
25. Remove and replace oxygen sensor.
26. Test electronic fuel mixture control system.

III. AUTOMOTIVE ELECTRICAL TECHNICIAN

A. Service Engine Electrical System

1. Inspect battery electrolyte level.
2. Test battery for surface leakage.
3. Test battery voltage.
4. Clean battery, posts, and cable connections.
5. Remove and replace battery cables.
6. Charge battery.
7. Test battery for capacity (load).
8. Measure ground system resistance.
9. Remove and replace generator or alternator.
10. Remove and replace charging system regulator.
11. Test starter current draw.
12. Remove and replace starter solenoid.
13. Remove and replace starter.
14. Test charging system output.
15. Test alternator output.
16. Rebuild alternator.
17. Test starter control circuit.
18. Test electrical motors.
19. Rebuild starter.
20. Read a schematic and apply it to a job.

B. Service Body Electrical System

1. Test fuses.
2. Remove and replace fuses.
3. Test circuit breakers.
4. Remove and replace circuit breakers.
5. Inspect lighting system for faulty bulbs.
6. Remove and replace light bulbs.
7. Test cigarette lighter circuit.
8. Test warning lamps.
9. Remove and replace warning lamps.
10. Test switches.
11. Remove and replace fuse block assembly.
12. Remove and replace sockets.
13. Adjust headlights.
14. Test parking light circuit.
15. Remove and replace dimmer switch.

16. Remove and replace turn signal switch.
17. Adjust backup light switch.
18. Remove and replace backup light switch.
19. Adjust stop light switch.
20. Check horn circuit.
21. Test horn relay.
22. Test sending units.
23. Remove and replace sending units.
24. Test radio power circuit.
25. Inspect radio speaker.
26. Remove and replace radio speaker.
27. Test radio antenna.
28. Remove and replace radio antenna.
29. Trim radio antenna.
30. Test turn signal circuit.
31. Test windshield wiper circuit.
32. Remove and replace windshield wiper motor.
33. Remove and replace windshield washer motor.
34. Test constant voltage regulator.
35. Test instrument gauges.
36. Remove and replace instrument gauges.
37. Test cruise control unit.
38. Remove and replace 4-way switch.

C. Service Heating and Air Conditioning System

1. Remove and replace compressor belts.
2. Inspect control cables.
3. Test blower motor.
4. Remove and replace blower motor.
5. Inspect clutch and pulley assembly.
6. Test air conditioner charge.
7. Charge system using pound cans.
8. Charge system using bulk source.
9. Perform leak test with halide torch.
10. Perform leak test with electronic tester.
11. Remove and replace refrigerant lines.
12. Check compressor oil level.
13. Test electrical control circuits.
14. Test vacuum components.
15. Test air conditioning thermal switch.
16. Test thermostatic clutch switch.
17. Remove and replace conditioning magnetic clutch assembly (piston type).
18. Remove and replace clutch and hub assembly (rotary type).
19. Test full throttle cutout switch.
20. Adjust full throttle cutout switch.
21. Remove and replace full throttle cutout switch.

IV. ENGINE REPAIR TECHNICIAN

A. Diagnose Engine Problems

1. Inspect engine for oil leaks.
2. Inspect cooling system for source of coolant loss.
3. Inspect to determine cause of overheating.
4. Inspect valve train and guides.
5. Inspect engine for source of mechanical engine noise.
6. Test cylinder balance using engine analyzer.
7. Test cylinder leakage.
8. Test compression.

B. Service Engine Block

1. Steam clean engine.
2. Remove and replace core plugs.
3. Test oil pump pressure.
4. Remove and replace motor mounts.
5. Remove and replace engine assembly.
6. Remove and replace oil pan.
7. Test oil pressure relief valve.

C. Service Cylinder Head and Valve Train

1. Inspect for rocker arm lubrication.
2. Remove and replace intake manifold.
3. Remove and replace cylinder head.
4. Remove and replace harmonic balancer.
5. Adjust hydraulic valve lifters.
6. Adjust mechanical valve lifters.
7. Inspect cylinder head for warp - cracks.
8. Remove and replace timing chain or belt.
9. Remove and replace timing gear.
10. Remove and replace camshaft.

D. Service Cooling System

1. Remove and replace drive belts.
2. Test coolant freezing point.
3. Install antifreeze.
4. Inspect water hoses.
5. Test coolant pressure caps.
6. Remove and replace heater hoses.
7. Remove and replace radiator hoses.
8. Remove and replace radiator.
9. Test thermal sensing switch.
10. Remove and replace thermal sensing switch.

11. Check variable speed fan clutch.
12. Remove and replace variable speed fan clutch.
13. Remove and replace electric cooling fan motor.
14. Chemically clean cooling system.
15. Remove and replace thermostat.
16. Test thermostat.
17. Pressure test cooling system.
18. Determine cause of overheating.
19. Remove and replace heater cores.
20. Remove and replace water pump.

E. Service Exhaust System

1. Remove and replace exhaust system supports.
2. Remove and replace muffler.
3. Remove and replace exhaust pipe.
4. Remove and replace tail pipe.
5. Check exhaust system for leaks and restrictions.
6. Remove and replace catalytic convertor.
7. Remove and replace exhaust manifold.

V. DRIVE TRAIN TECHNICIAN

A. Service Manual Transmission

1. Check fluid levels.
2. Adjust shift linkage.
3. Adjust manual clutch.
4. Adjust hydraulic clutch free travel.
5. Check clutch cable.
6. Remove and replace clutch cable.

B. Service Drive Lines

1. Inspect drive line for worn parts.
2. Lubricate universal joint.
3. Lubricate speedometer cable.
4. Remove and replace speedometer cable.
5. Remove and replace universal joint.
6. Remove and replace speedometer drive gear.
7. Remove and replace axle seal.
8. Remove and replace axle bearing.
9. Rebuild differential assembly (integral)
10. Remove and replace trans-axle assembly.
11. Rebuild trans-axle assembly.
12. Remove and replace front-drive axle assemblies.
13. Remove and replace pinion seal.

C. Service Automatic Transmissions

1. Replenish transmission oil.
2. Clean transmission oil strainer.
3. Remove and replace transmission oil filter.
4. Adjust automatic transmission shift linkage.
5. Test vacuum shift modulator.
6. Remove and replace shift modulator.
7. Adjust transmission shift indicator.
8. Adjust throttle valve cable.

VI. BRAKE TECHNICIAN

A. Service Brake System

1. Check and service fluid level.
2. Inspect brake hoses and lines.
3. Adjust brake shoes.
4. Free-up parking brake cable and linkage.
5. Adjust parking brake linkage.
6. Remove and replace parking brake cable and linkage.
7. Torque wheel lug nut.
8. Check brake operation.
9. Flush brake system.
10. Remove and replace brake hose.
11. Remove and replace brake line.
12. Remove and replace brake shoes.
13. Remove and replace self-adjusters.
14. Remove and replace wheel cylinder.
15. Rebuild wheel cylinder.
16. Remove and replace disc brake rotor.
17. Remove and replace caliper assembly.
18. Rebuild caliper assembly.
19. Remove and replace master cylinder.
20. Bleed brake system.
21. Grind (turn) brake drum.
22. Reface disc brake rotor.
23. Rebuild master cylinder.
24. Test rotor parallism.
25. Test rotor run-out.

VII. ALIGNMENT TECHNICIAN

A. Service Suspension System

1. Inspect suspension system for worn parts.
2. Inspect tires and wheels for damage and irregular wear.
3. Remove and replace shock absorbers.
4. Remove and replace wheel bearings (drum brakes).
5. Remove and replace wheel bearings (disc brakes).
6. Repack wheel bearings.
7. Remove and replace McPherson strut assembly.
8. Rebuild McPherson strut assembly.

B. Service Steering System

1. Inspect steering gear and linkage for worn parts.
2. Check and service fluid level.
3. Lubricate steering gear and linkage.
4. Test tire pressure.
5. Rotate tires.
6. Remove and replace belt/belts and set tension.
7. Remove and replace power steering hoses.
8. Remove and replace power steering cylinder.
9. Remove and replace power steering pump.
10. Adjust steering sector.
11. Rebuild power steering pump.

The following tasks were identified as not being entry-level, but were determined to be tasks commonly performed by Automotive Mechanics.

II. ENGINE PERFORMANCE TECHNICIAN

B. Service Ignition System

30. Rebuild distributor

C. Service Fuel System

25. Rebuild carburetor
26. Test fuel injection system
27. Remove and replace fuel injection computer
28. Test wiring harness of electronic fuel injection system
29. Remove and replace injection nozzle
30. Rebuild fuel injection nozzle
31. Remove and replace injection pump
32. Check waste gate adjustment
33. Adjust waste gate adjustment
34. Remove and replace turbocharger
35. Test electronic fuel mixture control system
36. Time diesel engine injection pump
37. Remove and replace injector (diesel)
38. Remove and replace line (diesel)
39. Test injector spray pattern (diesel)
40. Bleed fuel system (diesel)

III. AUTOMOTIVE ELECTRICAL TECHNICIAN

B. Service Body Electrical System

39. Test automatic alarm system
40. Remove and replace horn relay
41. Remove and replace horn
42. Remove and replace switches
43. Remove and replace stop light switch
44. Remove and replace cigarette lighter receptacle
45. Remove and replace constant voltage regulator
46. Remove and replace cruise control components
47. Remove and replace automatic alarm system components
48. Remove and replace power antenna motor
49. Remove and replace window motor
50. Remove and replace seat motors
51. Test automatic load leveling system
52. Adjust automatic load leveling system
53. Remove and replace automatic load leveling system components
54. Rebuild automatic load leveling system compressor
55. Remove and replace speedometer sending unit

C. Service Heating and Air Conditioning System

22. Flush system
23. Remove and replace dryer in air conditioning unit
24. Remove and replace condensor in air conditioning unit
25. Remove and replace evaporator
26. Remove and replace compressor
27. Remove and replace heater core
28. Remove and replace low pressure cut out switch
29. Remove and replace high pressure cut out switch
30. Remove and replace vacuum components
31. Remove and replace thermostatic clutch switch
32. Inspect air conditioning magnetic clutch switch
33. Fabricate refrigerant lines
34. Remove and replace compressor seals
35. Remove and replace measured orifice valve (expansion valve)
36. Test throttle-suctioning valve
37. Remove and replace throttle - suctioning valve
38. Inspect compressor reed plates
39. Remove and replace reed plates
40. Rebuild air conditioning compressor
41. Install air conditioner system

IV. ENGINE REPAIR TECHNICIAN

B. Service Engine Block

8. Remove and replace rod bearing(s)
9. Remove and replace piston(s)
10. Remove and replace crank shaft
11. Inspect block for warp
12. Hone cylinders
13. Install cam bearings
14. Assemble short block

C. Service Cylinder Head and Valve Train

11. Rebuild cylinder head

E. Service Exhaust System

8. Remove and Replace Converter Beads

V. DRIVE TRAIN TECHNICIAN

A. Service Manual Transmission

7. Remove and replace extension housing seal and bushing
8. Remove and replace manual transmission
9. Remove and replace pressure plate assembly
10. Remove and replace clutch release bearing
11. Remove and replace clutch release fork
12. Remove and replace pilot bearing
13. Remove and replace hydraulic clutch slave cylinder
14. Rebuild hydraulic clutch slave cylinder
15. Remove and replace hydraulic clutch master cylinder

16. Rebuild hydraulic clutch master cylinder
17. Replace flywheel
18. Rebuild manual transmission
19. Measure flywheel runout
20. Measure bellhousing runout
21. Remove and replace 4WD transfer case
22. Rebuild 4WD transfer case

B. Service Drive Lines

14. Remove and replace transmission mount
15. Check drive line angles
16. Remove and replace differential assembly (removable)
17. Remove and replace differential assembly (integral)
18. Rebuild differential assembly (removable)
19. Rebuild 4 wheel drive locking hubs
20. Rebuild power take off
21. Remove and replace drive shaft center support bearings
22. Rebuild constant velocity universal joints
23. Remove and replace constant velocity joints
24. Repack constant velocity joints
25. Remove and replace constant velocity boots
26. Align two piece drive shaft

C. Service Automatic Transmissions

9. Adjust bands
10. Pressure flush convertor assembly
11. Pressure flush automatic transmission cooler assembly
12. Remove and replace extension housing seal and bushing
13. Splice cooler lines
14. Pressure test transmission in car
15. Stall test automatic transmission in car
16. Remove and replace transmission governor
17. Clean transmission governor
18. Clean transmission valve body
19. Remove and replace automatic transmission with convertor assembly
20. Rebuild automatic transmission assembly
21. Measure convertor turbine end play
22. Air pressure test transmission on bench
23. Remove and replace torque convertor
24. Test automatic clutch converter control system
25. Adjust automatic clutch converter control system

VI. BRAKE TECHNICIAN

A. Service Brake System

26. Remove and replace backing plate
27. Remove and replace hydraulic power brake unit
28. Remove and replace hydro-brake booster unit
29. Rebuild hydro-brake booster unit
30. Remove and replace proportioning meter (combination valve)
31. Test brake anti-lock (skid) system
32. Replace defective components in brake anti-lock (skid) system

VII. ALIGNMENT TECHNICIAN

A. Service Suspension System

9. Remove and replace spring hangers
10. Remove and replace suspension bushings
11. Remove and replace control arms
12. Remove and replace ball joints
13. Remove and replace torsion bar
14. Remove and replace coil springs
15. Remove and replace king pins
16. Remove and replace spindle
17. Remove and replace leaf spring assembly
18. Remove and replace I Beam
19. Remove and replace stablizer and bushings

B. Service Steering System

12. Balance wheel and tire assembly
13. Remove and replace steering linkage components
14. Remove and replace steering damper
15. Remove and replace ignition switch rack
16. Remove and replace steering wheel
17. Remove and replace manual steering sector
18. Rebuild power steering cylinder
19. Remove and replace steering control valve
20. Rebuild power steering control valve
21. Remove and replace rack & pinion power steering assembly
22. Rebuild rack and pinion power steering
23. Rebuild rack and pinion manual steering assembly
24. Adjust toe-in
25. Align front end
26. Align rear wheels
27. Remove and replace turn signal switch
28. Remove and replace mast jacket
29. Set center line steering
30. Check SAI (Steering axis inclination)
31. Remove and replace tilt wheel and telescopic
32. Remove and replace steering seals
33. Rebuild steering column
34. Remove and replace steering column
35. Remove and replace steering column bearings, shift tube and socket
36. Replace shift detent

ND8413301

NORTH DAKOTA
VALIDATED
OCCUPATIONAL PROFILE
AND
TASK LISTING

Carpentry

Competency-Based Vocational Education

A Cooperative Project of

NORTH DAKOTA STATE BOARD FOR VOCATIONAL EDUCATION
CARROL BURCHINAL, DIRECTOR

AND

BUSINESS AND VOCATIONAL EDUCATION, UNIVERSITY OF NORTH DAKOTA
JAMES L. NAVARA, CHAIRMAN

OCCUPATIONAL PROFILE

VALIDATED COMPETENCIES

PROGRAM: BUILDING TRADES

3/84

I. COMPETENCIES COMMON TO ALL JOB TITLES IN THIS PROGRAM	A. Apply For A Job B. Practice Safety C. Use Basic Mathematics D. Measure E. Use Hand Tools F. Use Power Equipment G. Read Blueprints	H. Select Building Materials					
JOB TITLE	II. RESIDENTIAL CARPENTER						
MAJOR JOB COMPETENCIES	A. Estimate Materials B. Prepare the Building Site C. Build and Install Foundation Forms D. Install Rough Framing E. Finish Exteriors F. Install Roof Components G. Finish Interiors H. Assemble and Construct Stairs						

BUILDING TRADES

Number of Tasks Performed by Practioners and Number of Tasks Designated Entry Level as Validated by the Industry Task Committee Meeting in Bismarck, ND - March 23, 1984	No. of Tasks Performed by Practicioners	No. of Tasks Designated Entry Level
I. COMPETENCIES COMMON TO ALL JOB TITLES IN THIS PROGRAM	58	52
A. Apply for a Job	7	7
B. Practice Safety	7	7
C. Use Basic Mathematics	7	7
D. Measure	4	4
E. Use Hand Tools	15	15
F. Use Power Equipment	11	6
G. Read Blueprints	3	2
H. Select Building Materials	4	4
II. RESIDENTIAL CARPENTER	184	26
A. Estimate Materials	16	0
B. Prepare Building Site	5	0
C. Build and Install Foundation Forms	17	3
D. Install Rough Framing	52	19
E. Install Exterior Finishes	25	1
F. Install Roof Components	17	1
G. Install Interior Finishes	44	2
H. Assemble and Construct Stairs	8	0
TOTAL	242	78

BUILDING TRADES
VALIDATED COMPETENCIES

After completing this course of study, the student will be able to:

I. COMPETENCIES COMMON TO ALL JOB TITLES IN THIS PROGRAM:

A. Apply For A Job

1. Write a letter of application for a job
2. Make an appointment by telephone for an interview
3. Write a resume
4. Complete an application for a job
5. Write a follow-up letter after an interview
6. Complete a social security application
7. Interview for a job

B. Practice Safety

1. List safety rules to abide by in housekeeping, fire, electrical, first aid, hand tools, machines, and shop policies
2. Identify components of a fire triangle
3. Demonstrate personal safety
4. Demonstrate general shop safety
5. Demonstrate general safety precautions
6. Demonstrate the ability to keep a clean, orderly and safe work area
7. Demonstrate proficiency in first aid

C. Use Basic Mathematics

1. Add and subtract decimals
2. Add and subtract fractions
3. Convert fractions to decimals
4. Convert decimals to fractions
5. Convert feet to inches and inches to feet
6. Calculate volume
7. Calculate area

D. Measure

1. Identify basic measuring tools
2. Use measuring tools to accurately measure to 1/16 of an inch
3. Use a combination square
4. Use a framing square

E. Use Hand Tools

1. Use and maintain planes
2. Use and maintain squares
3. Use and maintain handsaws
4. Use and maintain hammers
5. Use and maintain screwdrivers

6. Use and maintain pliers
7. Use and maintain clamps
8. Use and maintain leveling and/or plumbing instruments
9. Use and maintain wrenches
10. Use and maintain boring and drilling tools
11. Use and maintain files
12. Use and maintain knives
13. Use and maintain ladders
14. Use and maintain scaffolds
15. Sharpen, care for, and/or recondition hand tools

F. Use Power Equipment

1. Use and maintain electric handsaw
2. Use and maintain saber and/or reciprocating saw
3. Use and maintain table saw
4. Use and maintain radial arm saw
5. Use and maintain electric hand drill
6. Use and maintain power nailer

G. Read Blueprints

1. Read an architects scale
2. Read and interpret construction symbols

H. Select Building Materials

1. Identify and select dimension lumber by size and grade
2. Identify and select plywood by size and grade
3. Identify and select sheathing by size and type
4. Identify and select fasteners for specific applications

II. RESIDENTIAL CARPENTER

A. Estimate Materials
(No entry-level tasks associated with this duty)

B. Prepare for Building Site
(No entry-level tasks associated with this duty)

C. Build and Install Foundation Forms

1. Strip form
2. Screed concrete
3. Waterproof concrete block wall

D. Install Rough Framing

1. Stack lumber
2. Assemble floor joists
3. Assemble cross bridging
4. Assemble ceiling joists
5. Install backing for hanging fixtures, cabinets, drapes, drywall and accessories
6. Install exterior wall sheathing
7. Assemble subfloors
8. Assemble common rafters

9. Assemble tail rafters
10. Assemble cripple jack rafters
11. Assemble hip rafter
12. Assemble hip jack rafters
13. Assemble valley rafter
14. Assemble valley jack rafters
15. Assemble gambrel roof rafters
16. Assemble gable studs
17. Install roof sheathing
18. Assemble wall component
19. Assemble bearing wall

E. Installing Exterior Finishes

1. Install building paper

F. Install Roof Components

1. Install roofing felt

G. Install Interior Finishes

1. Install batt insulation
2. Install vapor barrier

H. Assemble and Construct Stairs
(No entry-level tasks associated with this duty)

The following tasks were identified as not being entry level, but were determined to be tasks commonly performed by Residential Carpenters.

I. COMPETENCIES COMMON TO ALL JOB TITLES IN THIS PROGRAM:

F. Use Power Equipment

7. Use and maintain jointer
8. Use and maintain portable router
9. Use and maintain power plane
10. Use and maintain portable sander
11. Use and maintain motorized miter box

G. Read Blueprints

3. Extract elevations and dimensions from a prepared set of building plans

II. RESIDENTIAL CARPENTER

A. Estimate Materials

1. Estimate forming materials
2. Estimate concrete
3. Estimate concrete block
4. Estimate rough framing materials
5. Estimate roofing materials
6. Estimate windows
7. Estimate doors and jambs
8. Estimate interior underlayment
9. Estimate interior paneling/drywall
10. Estimate stairway materials
11. Estimate closet accessories
12. Estimate acoustical ceiling material
13. Estimate pre-fabricated cabinets
14. Estimate material for built-ins
15. Estimate finish hardware
16. Estimate siding

B. Prepare the Building Site

1. Establish elevation reference points from benchmark
2. Establish footing grade
3. Locate and square corners
4. Install batter boards
5. Set grade stakes

C. Build and Install Foundation Forms

4. Construct stud and sheathing wall form
5. Erect plywood panel wall form
6. Erect manufactured wall form
7. Construct stair form
8. Construct box for specified opening
9. Construct footing form
10. Place rebar/mesh

11. Install beam
12. Install anchor bolt in concrete
13. Install anchor bolt in concrete block
14. Install bulkhead
15. Install expansion and contraction joint in concrete slab
16. Install expansion and contraction joint in concrete wall
17. Install keyway for footing and foundation

D. Install Rough Framing

20. Construct single pole scaffold
21. Construct double pole scaffold
22. Install sill plate
23. Lay out work
24. Align and brace wall
25. Construct plywood box beam
26. Install diagonal bracing (wind brace)
27. Frame floor opening
28. Frame door opening
29. Frame window opening
30. Frame roof opening
31. Frame built-in stringer
32. Frame elevated stair stringer
33. Construct post and beam framing
34. Install steel beam
35. Install lally post
36. Install batten
37. Install metal studs
38. Set metal door frame
39. Set metal window frame
40. Construct roof truss
41. Install collar beams
42. Install overhang purlin
43. Install rafter support purlin
44. Install ridge board
45. Frame dormer without sidewalls
46. Frame dormer with sidewalls
47. Frame roof saddle
48. Frame snub gable
49. Construct intersecting gable roof
50. Cut headers
51. Frame stair opening
52. Box out for plumbing installations

E. Install Exterior Finishes

2. Construct box cornice
3. Construct rake cornice
4. Case exterior opening
5. Install wood jamb window unit
6. Hang exterior door
7. Install exterior door jamb
8. Install corner board for wood siding

9. Install wood fascia
10. Install wood soffit
11. Install metal fascia
12. Install metal soffit
13. Install prefabricated column
14. Install garage door
15. Install metal or vinyl siding
16. Install prefabricated storm unit
17. Install bevel siding
18. Install wood shingle siding
19. Install outside corner for wood shingle siding without corner board
20. Install panel siding
21. Construct and install wood louvers
22. Install fixed exterior shutters
23. Install caulking
24. Install siding accessories
25. Install garage door opener

F. Install Roof Components

2. Install chimney flashing
3. Install valley flashing
4. Install composite strip shingles
5. Install composite shingles on ridge cap
6. Install composite shingles in valley
7. Install composite shingles around roof opening
8. Install shingles over dormer or roof appendage
9. Install roof vent
10. Install ridge vent
11. Install skylight
12. Install wood shingles/shakes
13. Install wood shingles/shakes on ridge cap
14. Install wood shingles/shakes in valley
15. Install wood shingles/shakes around roof opening
16. Install gutter
17. Install downspout

G. Install Interior Finishes

3. Install wall paneling
4. Assemble prefabricated cabinet
5. Install closet accessories
6. Install interior door jamb
7. Construct built-in cabinet
8. Install shelving
9. Install baseboards
10. Install ceiling molding
11. Hang drywall
12. Case interior opening
13. Hang interior door
14. Install prehung door unit (split jamb)
15. Install double-acting door
16. Install folding (accordian) door
17. Install sliding door
18. Install bi-fold door
19. Install pocket door

20. Install cylinder lockset
21. Install mortise lockset
22. Install closer
23. Install door holder
24. Install panic bar
25. Install flush bolt
26. Install door plate
27. Install weatherstripping
28. Install wall cabinet
29. Install base cabinet
30. Install recessed medicine cabinet
31. Install threshold
32. Install gypsum lath
33. Install corner beading
34. Install plaster grounds
35. Install parquet flooring
36. Install plank flooring
37. Install tongue and groove flooring
38. Install suspended T-grid ceiling
39. Install tongue and groove ceiling tiles
40. Install underlayment
41. Install plastic laminate
42. Install post-form tops
43. Cut out sink and range openings
44. Install bath accessories

H. Assemble and Construct Stairs

1. Install prefabricated stairs
2. Install disappearing stair unit
3. Construct open riser stairs
4. Construct box stairs
5. Install wood newel post, balusters, and railing
6. Install metal newel post and railing
7. Mortise stair jacks to receive stair treads
8. Layout and cut stair jack

ND8413301

NORTH DAKOTA
VALIDATED
OCCUPATIONAL PROFILE
AND
TASK LISTING

Health Occupations

Competency-Based Vocational Education

A Cooperative Project of

NORTH DAKOTA STATE BOARD FOR VOCATIONAL EDUCATION
CARROL BURCHINAL, DIRECTOR

AND

BUSINESS AND VOCATIONAL EDUCATION, UNIVERSITY OF NORTH DAKOTA
JAMES L. NAVARA, CHAIRMAN

OCCUPATIONAL PROFILE
VALIDATED COMPETENCIES

PROGRAM HEALTH OCCUPATIONS

4/84

I. COMPETENCIES COMMON TO ALL JOB TITLES IN THIS PROGRAM	A. Apply For A Job B. Practice Personal Grooming C. Examine Human Relations D. Practice Medical Ethics E. Use Medical Terminology and Abbreviations F. Practice Safety G. Practice Medical Asepsis		H. Perform Emergency Measures I. Examine Anatomy and Physiology J. Examine Special Care For The Elderly K. Provide Supportive Care to the Dying L. Perform Standard First Aid Measures			
JOB TITLE	II. Nursing Assistant					
MAJOR JOB COMPETENCIES	A. Assist With Bathing B. Assist With Personal Grooming C. Care For Beds D. Perform Isolation Techniques E. Assist With Ambulation F. Position In Bed G. Apply Heat and Cold H. Assist With Elimination I. Admit, Transfer and Dis-Charge J. Maintain Fluid Balance K. Maintain Records	L. Care for Infant M. Care for Orthopedic Individual N. Assist With Nutrition O. Use Assistive Devices P. Use Safety Devices (Restraints) Q. Perform Special Procedures R. Prepare Body For Mortuary				

Number of Tasks Performed by Practioners and Number of Tasks Designated Entry Level as Validated by the Industry Task Committee Meeting in Bismarck, ND - April 13, 1984	No. of Tasks Performed by Practicioners	No. of Task Designated Entry Level
I. COMPETENCIES COMMON TO ALL JOB TITLES IN THIS PROGRAM	60	54
A. Apply For a Job	5	5
B. Practice Personal Grooming	3	3
C. Examine Human Relations	6	6
D. Practice Medical Ethics	3	3
E. Use Medical Terminology and Abbreviations	3	3
F. Practice Safety	4	4
G. Practice Medical Asepsis	3	3
H. Perform Emergency Measures	2	2
I. Examine Anatomy and Physiology	19	19
J. Examine Special Care for the Elderly	3	3
K. Provide Supportive Care for the Dying	3	3
L. Perform Standard First Aid Measures	6	0
II. NURSING ASSISTANT	130	117
A. Assist With Bathing	6	5
B. Assist With Personal Grooming	12	12
C. Care For Beds	4	4
D. Perform Isolation Techniques	7	7
E. Assist With Ambulation	11	11
F. Position in Bed	8	8
G. Apply Heat and Cold	5	4
H. Assist With Elimination	13	12
I. Admit, Transfer and Discharge	5	5
J. Maintain Fluid Balance	5	5
K. Maintain Records	4	4
L. Care for Infant	3	3
M. Care for Orthopedic Individual	4	4
N. Assist With Nutrition	5	5
O. Use Assistive Devices	4	4
P. Use Safety Devices (Restraints)	3	3
Q. Perform Special Procedures	23	21
R. Prepare Body for Mortuary	8	0
TOTAL	190	171

HEALTH OCCUPATIONS
Validated Competencies

After completing this course of study, the student will be able to:

I. COMPETENCIES COMMON TO ALL JOB TITLES IN THIS PROGRAM

A. Apply For A Job
1. Write a letter of application
2. Make an interview appointment by phone
3. Write a resume
4. Complete an employment application form
5. Interview for a job

B. Practice Personal Grooming

1. Complete a grooming checklist
2. Use cosmetics appropriately
3. Manicure Nails

C. Examine Human Relations

1. Identify reasons employees lose their jobs
2. Communicate with employer
3. Communicate with peer
4. Communicate with patient
5. Respect and respond to patient religious preference
6. Identify the role of each member of the health care team

D. Practice Medical Ethics

1. Define medical ethics
2. Demonstrate ethical behavior
3. Relate the concept of confidentiality

E. Use Medical Terminology and Abbreviations

1. Use a medical dictionary
2. Define common medical terms
3. Identify common medical abbreviations

F. Practice Safety

1. List safety precautions associated with patient care
2. List safety precautions associated with medical facility housekeeping
3. List safety precautions associated with movement in a medical facility
4. List rules of body mechanics

G. Practice Medical Asepsis

1. Relate the concept of clean/dirty
2. Wash hands using aseptic technique
3. Handle sterile equipment

H. Perform Emergency Measures

1. Perform the Heimlich manuever
2. Perform cardiopulmonary resuscitation

I. Examine Anatomy and Physiology

1. Recognize body directions
2. Describe the function of the musculor-skeletal system
3. Describe the function of the digestive system
4. Describe the function of the circulatory system
5. Describe the function of the respiratory system
6. Describe the function of the neural system
7. Describe the function of the urinary system
8. Describe the function of the endocrine system
9. Describe the function of the sensory system
10. Describe the function of the reproductive system
11. Locate the principle organs of the musculo-skeletal system
12. Locate the principle organs of the digestive system
13. Locate the principle organs of the circulatory system
14. Locate the principle organs of the respiratory system
15. Locate the principle organs of the neural system
16. Locate the principle organs of the urinary system
17. Locate the principle organs of the endocrine system
18. Locate the principle organs of the sensory system
19. Locate the principle organs of the reproductive system

J. Examine Special Care for the Elderly

1. List five basic human needs
2. Identify nursing approaches used in meeting each of the basic human needs
3. Relate technique used to prevent skin tears

K. Provide Supportive Care to the Dying

1. Identify stages of dying
2. Respond to behaviors exhibited by an individual in each of the stages of dying
3. Respond to behaviors exhibited by a dying individual's family

L. Perform Standard First Aid Measures

(No entry level tasks associated with this duty)

II. NURSING ASSISTANT

A. Assist With Bathing

1. Give a bed bath
2. Assist with a shower
3. Assist with a tub bath
4. Give a partial bath
5. Give a chair shower

B. Assist With Personal Grooming

1. Assist with undressing
2. Assist with dressing
3. Give a sink shampoo
4. Give a shower shampoo
5. Give a bed shampoo
6. Brush/comb/arrange hair
7. Assist with oral hygiene
8. Care for dentures/partials
9. Give a back rub
10. Assist with hearing aid
11. Care for eyeglasses/contact lens
12. Assist with shaving

C. Care For Beds

1. Make an unoccupied bed
2. Make an occupied bed
3. Make a surgical bed
4. Adjust bed to different positions

D. Perform Isolation Techniques

1. Identify types of isolation
2. Prepare a unit for isolation
3. Put on and remove mask
4. Put on and remove gown
5. Put on and remove gloves
6. Perform double bagging
7. Serve and remove diet tray

E. Assist With Ambulation

1. Assist to dangle
2. Assist to ambulate
3. Assist in using a wheelchair
4. Ambulate using a walker
5. Ambulate using canes
6. Ambulate using crutches
7. Ambulate using a transfer belt
8. Assist with transfer to/from bed/chair
9. Assist with transfer to/from commode or toilet
10. Assist with transfer to/from stretcher
11. Transport with a stretcher

F. Position in Bed

1. Perform prone positioning
2. Perform supine positioning
3. Perform side-lying positioning
4. Raise head and shoulders from bed
5. Move individual toward the head of the bed
6. Reposition individual when making bed adjustment
7. Assist with Range of Motion exercises
8. Raise head of bed

G. Apply Heat and Cold

1. Apply local heat with warm water bottle
2. Apply local heat with aqua-K-pad
3. Administer tepid bath
4. Apply ice pack

H. Assist with Elimination

1. Collect a routine urine specimen
2. Collect a clean-catch urine specimen
3. Collect a 24 hour urine specimen
4. Check urine for sugar and acetone
5. Give an enema
6. Collect a stool specimen
7. Give perineal care
8. Give and remove bedpan
9. Give and remove urinal
10. Clean elimination devices
11. Apply adult incontinent brief
12. Care for individual using a urinary drainage system

I. Admit, Transfer and Discharge

1. Prepare a unit for admission
2. Assist with admission
3. Assist with transfer
4. Assist with discharge
5. Clean unit following discharge

J. Maintain Fluid Balance

1. Measure output
2. Measure intake
3. Record intake/output information
4. Care for individual receiving I.V. therapy
5. Encourage fluid intake

K. Maintain Records

1. Record care given
2. Record vital signs
3. Receive and deliver mail, gifts and flowers
4. Accept and relay telephone messages

L. Care for Infant

1. Carry infant
2. Weigh infant
3. Measure infant

M. Care for Orthopedic Individual

1. Apply and remove brace
2. Apply and remove prosthesis
3. Care for individual in cast
4. Care for individual in traction

N. Assist With Nutrition

1. Prepare individual for mealtime
2. Serve food trays
3. Assist individual to eat
4. Feed with eating utensils
5. Feed with syringe

O. Use Assistive Devices

1. Operate a mechanical lift
2. Assist in using a toilet seat extension
3. Assist in using grab rails
4. Assist in using adaptive eating devices

P. Use Safety Devices (Restraints)

1. Operate side rails
2. Apply safety devices
3. Release safety devices and reposition individual

Q. Perform Special Procedures

1. Measure oral temperature with a mercury thermometer
2. Measure oral temperature with an electronic thermometer
3. Measure rectal temperature with a mercury thermometer
4. Measure rectal temperature with an electronic thermometer
5. Measure axillary temperature with a mercury thermometer
6. Measure axillary temperature with an electronic thermometer
7. Measure pulse
8. Measure respiration
9. Measure blood pressure with a stethoscope and sphygmomanometer
10. Measure blood pressure electronically
11. Prevent pressure sores
12. Identify the degrees of pressure sores
13. Cleanse the inner and outer canthus of the eye
14. Assist with foot care
15. Assess skin condition
16. Apply anti-embolic stocking
17. Assist with sitz bath
18. Empty colostomy drainage bag
19. Identify tasks associated with AM care
20. Identify tasks associated with PM care
21. Identify tasks associated with hour of sleep care

R. Prepare Body for Mortuary

(No entry level tasks associated with this duty)

The following tasks were identified as not being entry level, but were determined to be tasks commonly performed by Nursing Assistants.

I. COMPETENCIES COMMON TO ALL JOB TITLES IN THIS PROGRAM

L. Perform Standard First Aid Measures

1. Control bleeding of wound
2. Apply a spiral turn bandage
3. Splint a fracture of the forearm
4. Splint a fracture of the lower leg
5. Position individual for treatment of shock
6. Evacuate individual

II. NURSING ASSISTANT

A. Assist with Bathing

6. Give a commercial cleansing agent towel bath

G. Apply Heat and Cold

5. Apply heat with heat lamp

H. Assist with Elimination

13. Remove a fecal impaction

Q. Perform Special Procedures

22. Change colostomy drainage bag
23. Give obstetric perineal care

R. Prepare Body for Mortuary

1. Remove equipment and supplies from room to proper storage area
2. Remove adhesion marks from body
3. Give partial bath
4. Clean mouth
5. Close eyelids
6. Recheck for leakage and reclean
7. Place body in back-lying position and cover
8. List and pack personal effects

ND 841330

NORTH DAKOTA
VALIDATED
OCCUPATIONAL PROFILE
AND
TASK LISTING

Welding

Competency-Based Vocational Education

A Cooperative Project of

NORTH DAKOTA STATE BOARD FOR VOCATIONAL EDUCATION
CARROL BURCHINAL, DIRECTOR

AND

BUSINESS AND VOCATIONAL EDUCATION, UNIVERSITY OF NORTH DAKOTA
JAMES L. NAVARA, CHAIRMAN

OCCUPATIONAL PROFILE

VALIDATED COMPETENCIES

PROGRAM: WELDING

3/84

I. COMPETENCIES COMMON TO ALL JOB TITLES IN THIS PROGRAM	A. Apply For A Job B. Practice Safety C. Use Hand Tools D. Use Power Equipment E. Select Metals F. Use Basic Mathematics and Metrics G. Measure H. Read Welding Symbols and Blueprints					
JOB TITLE	II. COMBINATION WELDER					
MAJOR JOB COMPETENCIES	A. Use Oxy-Acetylene Fusion Welding and Cutting Equipment. B. Use Shielded Metal Equipment With Mild Steel Electrodes C. Use Shielded Metal Equipment With Low Hydrogen Electrodes D. Use Semi-Automatic Wire Feed Gas Metal Equipment (MIG) E. Use Flux Cored Arc Welding Equipment F. Use Submerged Arc Welding Equipment G. Use Gas Tungsten (TIG) Equipment Without Pulsation H. Use Gas Tungsten (TIG) Equipment With Pulsation					

WELDING

Number of Tasks Performed by Practioners and Number of Tasks Designated Entry Level as Validated by the Industry Task Committee Meeting in Bismarck, ND - March 5, 1984	No. of Tasks Performed by Practicioners	No. of Tasks Designated Entry Level
I. COMPETENCIES COMMON TO ALL JOB TITLES IN THIS PROGRAM	44	44
A. Apply For A Job	4	4
B. Practice Safety	7	7
C. Use Hand Tools	7	7
D. Use Power Equipment	4	4
E. Select Metals	4	4
F. Use Basic Mathematics and Metrics	7	7
G. Measure	6	6
H. Read Welding Symbols and Blueprints	5	5
II. COMBINATION WELDER	145	77
A. Use Oxy-Acetylene Fusion Welding and Cutting Equipment	11	11
B. Use Shielded Metal Equipment With Mild Steel Electrode	25	25
C. Use Shielded Metal Equipment With Low Hydrogen Electrode	25	25
D. Use Semi-Automatic Wire Feed Gas Metal Equipment (MIG)	16	16
E. Use Flux Cored Arc Welding Equipment	15	0
F. Use Submerged Arc Welding Equipment	5	0
G. Use Gas Tungsten (TIG) Equipment Without Pulsation	25	0
H. Use Gas Tungsten (TIG) Equipment With Pulsation	23	0
TOTAL	189	121

WELDING
VALIDATED COMPETENCIES

After completing this course of study, the student will be able to:

I. COMPETENCIES COMMON TO ALL JOB TITLES IN THIS PROGRAM

A. Apply For A Job

1. Make an appointment by telephone for an interview
2. Write a resume
3. Complete an application for a job
4. Perform welding qualification tests

B. Practice Safety

1. List safety rules to abide by in housekeeping, fire, electrical, first aid, hand tool, machine, and shop policies.
2. Identify components of a fire triangle.
3. Demonstrate personal safety
4. Demonstrate general shop safety
5. Demonstrate general welding safety precautions
6. Demonstrate the ability to keep a clean, orderly, and safe work area
7. Demonstrate the ability to handle, transport and rig metal safely

C. Use Hand Tools

1. Use hammers
2. Use screwdrivers
3. Use pliers
4. Use adjustable wrenches
5. Use rachet and sockets
6. Use hacksaw
7. Use punches

D. Use Power Equipment

1. Use equipment that parts metal
2. Use equipment that cuts metal
3. Use equipment that drills metal
4. Use equipment that grinds metal

E. Select Metals

1. Identify shapes of metals
2. Identify sizes of metals
3. Identify metals using the spark test
4. Describe properties of metals

F. Use Basic Mathematics and Metrics

1. Add and subtract fractions
2. Add and subtract decimals
3. Convert fractions to decimals
4. Convert decimals to fractions
5. Measure distances using the English System
6. Measure distances using the Metric System
7. Use metric/English conversion table

G. Measure

1. Identify basic measuring tools
2. Use measuring tools to accurately measure to 1/16 of an inch
3. Use a combination square
4. Use outside calipers
5. Use inside calipers
6. Use a steel square

H. Read Welding Symbols and Blueprints

1. Read and interpret welding symbols
2. Interpret drawings in the orthographic, isometric and pictorial view formats
3. Recognize and use standard engineering drawing lines for welders
4. Interpret welding information found on engineering drawings
5. Lay out a job from a set of blueprints

II. COMBINATION WELDER

A. Use Oxy-Acetylene Fusion Welding and Cutting Equipment

1. Safely handle oxy-acetylene equipment
2. Select tip size and filler rod type based on metal thickness
3. Adjust gas pressures
4. Turn on, light, adjust, and shut down equipment
5. Lay a stringer bead in the flat position without and with filler metal
6. Make a 90° cut in mild steel
7. Make a flame beveled cut on steel plate
8. Cut a hole in mild steel
9. Set up a machine cutting torch and portable carriage
10. Make a 90° straight cut on mild steel plate with the machine cutting assembly
11. Make a 30° bevel cut on mild steel plate with the machine cutting assembly

B. Use Shielded Metal Equipment With Mild Steel Electrode

1. Select electrode type and size for given applications
2. Strike and control arc in the flat position
3. Weld stringer beads in the flat position
4. Weld stringer beads in the horizontal position
5. Weld stringer beads in the vertical up position
6. Weld stringer beads in the overhead position
7. Pad beads in the flat position and fill craters
8. Weld a square groove butt joint in the flat position
9. Weld a square groove butt joint in the horizontal position
10. Weld a square groove butt joint in the vertical up position
11. Weld a square groove butt joint in the overhead position
12. Weld a single vee groove butt joint in the flat position
13. Weld a single vee groove butt joint in the horizontal position
14. Weld a single vee groove butt joint in the vertical up position
15. Weld a single vee groove butt joint in the overhead position

16. Weld a single pass fillet lap joint in the horizontal position
17. Weld a single pass fillet lap joint in the vertical up position
18. Weld a single pass fillet lap joint in the vertical down position
19. Weld a single pass fillet lap joint in the overhead position
20. Weld a 3 bead fillet tee joint in the horizontal position
21. Weld a 3 bead fillet tee joint in the vertical up position
22. Weld a 3 bead fillet tee joint in the overhead position
23. Weld a root and 2 bead 45° weave fillet joint in the horizontal position
24. Weld a root and 2 bead 45° weave fillet joint in the vertical up position
25. Weld a root and 2 bead 45° weave fillet joint in the overhead position

C. Use Shielded Metal Equipment With Low Hydrogen Electrodes

1. Select electrode type and size for given applications
2. Strike and control arc in the flat position
3. Weld stringer beads in the flat position
4. Weld stringer beads in the horizontal position
5. Weld stringer beads in the vertical up position
6. Weld stringer beads in the overhead position
7. Pad beads in the flat position and fill craters
8. Weld a square groove butt joint in the flat position
9. Weld a square groove butt joint in the horizontal position
10. Weld a square groove butt joint in the vertical up position
11. Weld a square groove butt joint in the overhead position
12. Weld a single vee groove butt joint in the flat position
13. Weld a single vee groove butt joint in the horizontal position
14. Weld a single vee groove butt joint in the vertical up position
15. Weld a single vee groove butt joint in the overhead position
16. Weld a single pass fillet lap joint in the horizontal position
17. Weld a single pass fillet lap joint in the vertical up position
18. Weld a single pass fillet lap joint in the vertical down position
19. Weld a single pass fillet lap joint in the overhead position
20. Weld a 3 bead fillet tee joint in the horizontal position
21. Weld a 3 bead fillet tee joint in the vertical up position
22. Weld a 3 bead fillet tee joint in the overhead position
23. Weld a root and 2 bead 45° weave fillet joint in the horizontal position
24. Weld a root and 2 bead 45° weave fillet joint in the vertical up position
25. Weld a root and 2 bead 45° weave fillet joint in the overhead position

D. Use Semi-Automatic Wire Feed Gas Metal Equipment (MIG)

1. Start up, adjust and shut down gas metal arc welding equipment
2. Surface weld in the flat position
3. Weld a square groove butt joint in the flat position
4. Weld a square groove butt joint in the horizontal position
5. Weld a square groove butt joint in the vertical down position
6. Weld a square groove butt joint in the vertical up position
7. Weld a square groove butt joint in the overhead position
8. Weld a single vee groove butt joint in the flat position
9. Weld a single vee groove butt joint in the horizontal position
10. Weld a single vee groove butt joint in the vertical down position
11. Weld a single vee groove butt joint in the vertical up position
12. Weld a single vee groove butt joint in the overhead position
13. Weld a fillet tee joint in the horizontal position
14. Weld a fillet tee joint in the vertical down position
15. Weld a fillet tee joint in the vertical up position
16. Weld a fillet tee joint in the overhead position

The following tasks were identified as not being entry level, but were determined to be tasks commonly performed by combination welders.

E. Use Flux Cored Arc Welding Equipment

1. Start up, adjust, and shut down flux cored arc welding equipment
2. Weld a vee groove butt joint in the flat position
3. Weld a vee groove butt joint in the horizontal position
4. Weld a vee groove butt joint in the vertical up position
5. Weld a vee groove butt joint in the overhead position
6. Weld a fillet lap joint in the flat position
7. Weld a fillet lap joint in the horizontal position
8. Weld a fillet lap joint in the vertical down position
9. Weld a fillet lap joint in the vertical up position
10. Weld a fillet lap joint in the overhead position
11. Weld a fillet tee joint in the flat position
12. Weld a fillet tee joint in the horizontal position
13. Weld a fillet tee joint in the vertical down position
14. Weld a fillet tee joint in the vertical up position
15. Weld a fillet tee joint in the overhead position

F. Use Submerged Arc Welding Equipment

1. Start up, adjust, and shut down submerged arc welding equipment
2. Weld, in the flat position a square groove butt joint
3. Weld, in the flat position a vee groove butt joint
4. Weld, in the flat position a fillet tee joint
5. Build-up metal surfaces

G. Use Gas Tungsten (TIG) Equipment Without Pulsation

1. Set up a flow meter regulator for shielding gases
2. Set up and shut down equipment
3. Weld a stringer bead in the flat position without filler metal
4. Weld a stringer bead in the flat position with filler metal
5. Weld a fillet lap joint in the flat position without filler metal
6. Weld a fillet lap joint in the flat position with filler metal
7. Weld a fillet tee joint in the flat position without filler metal
8. Weld a fillet tee joint in the flat position with filler metal
9. Weld a square groove butt joint in the flat position without filler metal
10. Weld a square groove butt joint in the flat position with filler metal
11. Weld a square groove butt joint in the horizontal position without filler metal
12. Weld a square groove butt joint in the horizontal position with filler metal
13. Weld a fillet lap joint in the horizontal position without filler metal
14. Weld a fillet lap joint in the horizontal position with filler metal
15. Weld a fillet tee joint in the horizontal position without filler metal
16. Weld a fillet tee joint in the horizontal position with filler metal
17. Weld a square groove butt weld in the vertical position without filler metal
18. Weld a square groove butt weld in the vertical position with filler metal
19. Weld a fillet lap joint in the vertical position without filler metal
20. Weld a fillet lap joint in the vertical position with filler metal
21. Weld a fillet tee joint in the vertical position without filler metal
22. Weld a fillet tee joint in the vertical position with filler metal
23. Weld a square groove butt joint in the overhead position
24. Weld a fillet lap joint in the overhead position
25. Weld a fillet tee joint in the overhead position

H. Use Gas Tungsten (TIG) Equipment with Pulsation

1. Weld a stringer bead in the flat position without filler metal
2. Weld a stringer bead in the flat position with filler metal
3. Weld a fillet lap joint in the flat position without filler metal
4. Weld a fillet lap joint in the flat position with filler metal
5. Weld a fillet tee joint in the flat position without filler metal
6. Weld a fillet tee joint in the flat position with filler metal
7. Weld a square groove butt joint in the flat position without filler metal
8. Weld a square groove butt joint in the flat position with filler metal
9. Weld a square groove butt joint in the horizontal position without filler meta.
10. Weld a square groove butt joint in the horizontal position with filler metal
11. Weld a fillet lap joint in the horizontal position without filler metal
12. Weld a fillet lap joint in the horizontal position with filler metal
13. Weld a fillet tee joint in the horizontal position without filler metal
14. Weld a fillet tee joint in the horizontal position with filler metal
15. Weld a square groove butt weld in the vertical position without filler metal
16. Weld a square groove butt weld in the vertical position with filler metal
17. Weld a fillet lap joint in the vertical position without filler metal
18. Weld a fillet lap joint in the vertical position with filler metal
19. Weld a fillet tee joint in the vertical position without filler metal
20. Weld a fillet tee joint in the vertical position with filler metal
21. Weld a square groove butt joint in the overhead position
22. Weld a fillet lap joint in the overhead position
23. Weld a fillet tee joint in the overhead position

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NORTH DAKOTA
VALIDATED
OCCUPATIONAL PROFILE
AND
TASK LISTING

Electronics

Competency-Based Vocational Education

A Cooperative Project of

NORTH DAKOTA STATE BOARD FOR VOCATIONAL EDUCATION
CARROL BURCHINAL, DIRECTOR

AND

BUSINESS AND VOCATIONAL EDUCATION, UNIVERSITY OF NORTH DAKOTA
JAMES L. NAVARA, CHAIRMAN

OCCUPATIONAL PROFILE

VALIDATED COMPETENCIES

PROGRAM ELECTRONICS

4/84

I. COMPETENCIES COMMON TO ALL JOB TITLES IN THIS PROGRAM	A. Apply For A Job B. Practice Safety C. Use Hand Tools D. Apply Basic Electronics Principles E. Read and Interpret Schematics F. Solder and Fabricate Circuits G. Perform Scientific Calculations H. Apply Fundamentals of Direct Current I. Apply Fundamentals of Alternating Current J. Examine the Nature of Matter and the P-N Junction K. Examine Rectifiers L. Examine Filters M. Examine Semi-Conductor Diodes	N. Examine Transitors O. Examine Bipolar - Junction Transistor Circuits P. Examine Transistor Amplifiers Q. Examine Operational Amplifiers R. Examine Logic Devices S. Examine Logic Systems T. Examine Special Semi-Conductor Devices U. Examine Oscillators V. Examine Transmitters W. Examine Receivers X. Examine Electron Tubes Y. Examine Microwaves Z. Examine Computers

JOB TITLE	II. Electronics Technician						
MAJOR JOB COMPETENCIES	A. Demonstrate Basic Skills B. Operate Basic Test Equipment C. Work with DC Electronics D. Work with AC Electronics E. Analyze Problem Circuits F. Repair Electronic Devices G. Analyze Computers						

82

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ELECTRONICS

Number of Tasks Performed by Practioners and Number of Tasks Designated Entry Level as Validated by the Industry Task Committee Meeting in Bismarck, ND - March 30, 1984	No. of Tasks Performed by Practicioners	No. of Tasks Designated Entry Level
I. COMPETENCIES COMMON TO ALL JOB TITLES IN THIS PROGRAM	204	204
A. Apply For A Job	3	3
B. Practice Safety	1	1
C. Use Hand Tools	3	3
D. Apply Basic Electronics Principles	5	5
E. Read and Interpret Schematics	5	5
F. Solder and Fabricate Circuits	10	10
G. Perform Scientific Calculations	6	6
H. Apply Fundamentals of Direct Current		
I. Apply Fundamentals of Alternating Current	43	43
J. Examine The Nature of Matter and the P-N Junction		
K. Examine Rectifiers	5	5
L. Examine Filters	3	3
M. Examine Semi-Conductor Diodes	2	2
N. Examine Transistors	2	2
O. Examine Bipolar-Junction Transistor Circuits	5	5
P. Examine Transistor Amplifiers	5	5
Q. Examine Operational Amplifiers	7	7
R. Examine Logic Devices	6	6
S. Examine Logic Systems	3	3
T. Examine Special Semi-Conductor Devices	8	8
U. Examine Oscillators	2	2
V. Examine Transmitters	4	4
W. Examine Receivers	4	4
X. Examine Electron Tubes	2	2
Y. Examine Microwaves	7	7
Z. Examine Computers	9	9
II. ELECTRONICS TECHNICIAN	87	87
A. Demonstrate Basic Skills	18	18
B. Operate Basic Test Equipment	8	8
C. Work with DC Electronics	3	3
D. Work with AC Electronics	6	6
E. Analyze Problem Circuits	11	11
F. Repair Electronic Devices	16	16
G. Analyze Computers	25	25
TOTAL	291	291

ELECTRONICS
VALIDATED COMPETENCIES

After completing this course of study, the student will be able to:

I. COMPETENCIES COMMON TO ALL JOB TITLES IN THIS PROGRAM:

A. Apply For A Job
   1. Write a resume
   2. Make an appointment by telephone for an interview
   3. Complete an application for a job

B. Practice Safety
   1. Score 100% on a test relating to electrical shock, safety rules, fire safety, equipment safety, static electricity control devices, equipment handling practices, random power surge control, tool safety, and microwave safety

C. Use Hand Tools
   1. Identify basic electronics shop hand tools
   2. Care for tools
   3. Select the proper tool for a given task

D. Apply Basic Electronics Principles
   1. Test batteries
   2. Generate electricity with magnetism
   3. Generate electricity with pressure
   4. Generate electricity with heat
   5. Generate electricity with light

E. Read and Interpret Schematics
   1. Identify electronic symbols used on schematics
   2. Draw and label a schematic of a circuit board
   3. Identify components of a circuit board from a schematic
   4. Trace a signal on a detached schematic
   5. Trace a signal on an attached schematic

F. Solder and Fabricate Circuits
   1. Strip and tin wires for soldered connections
   2. Solder wires to turret terminals
   3. Desolder wires from turret terminals
   4. Solder wires to a terminal strip
   5. Repair a printed circuit board by replacing resistors and correcting open or broken leads
   6. Splice wires by soldering
   7. Splice wires by crimping
   8. Connect ends by flexible printed wiring
   9. Remove and replace integrated circuits
   10. Terminate by wire wrapping

G. Perform Scientific Calculations
   1. Use an electronic calculator
   2. Solve combined multiplication and division problems
   3. Convert numbers between binary, octal, hexidecimal and decimal systems
   4. Express numbers in scientific notation
   5. Express numbers in engineering notation
   6. Estimate voltage values

H. Apply Fundamentals of Direct Current
   1. Complete a resistor color chart
   2. Compute the value of a resistor using the color chart
   3. Determine resistance values from given color codes
   4. Measure circuit resistance with an ohmmeter
   5. Compute the resistance of a complex circuit
   6. Read voltmeter analog scales
   7. Read voltmeter digital scales
   8. Measure and compare the voltage of three different batteries
   9. Measure the voltage drop in a DC circuit
   10. Identify the circuit loading effects of a voltmeter
   11. Convert amperes to milliamps and microamps
   12. Read an ammeter
   13. Measure and compare current at two points of a circuit
   14. Measure and compare current in a circuit at two different voltage levels
   15. Identify the circuit loading effects of an ammeter
   16. Compute power using the power formula
   17. Compute current using the power formula
   18. Determine the power used in a resistive circuit
   19. Determine the function of fuses and resistor power ratings
   20. Determine the power rating of electronic components
   21. Distinguish between conductors, semi-conductors and insulators
   22. Calculate resistance given the diameter and length of wire
   23. Identify applications for different types of insulation materials
   24. Apply Ohm's Law to solve for voltage
   25. Apply Ohm's Law to solve for current
   26. Apply Ohm's Law to solve for resistance
   27. Apply Ohm's Law to solve for an unknown using circuit measurement
   28. Measure voltage drop in a series circuit
   29. Measure current values in a series circuit
   30. Measure resistance in a series circuit
   31. Measure power in a series circuit
   32. Measure voltage in a parallel circuit
   33. Measure current in a parallel circuit
   34. Measure resistance in a parallel circuit
   35. Measure power in a parallel circuit
   36. Measure voltage in series-parallel circuits
   37. Measure current in series-parallel circuits
   38. Measure resistance in series-parallel circuits
   39. Construct a voltage divider and analyze its function
   40. Show lines of magnetic force around a magnet
   41. Demonstrate that magnetic poles can attract and repel

42. Construct a simple electromagnet
43. Demonstrate effects of magnetism on electronic equipment
44. Produce motor action from a current-carrying conductor in a magnetic field
45. Calculate motor power
46. Calculate motor efficiency
47. Calculate horsepower of a small motor
48. Identify applications for a stepper motor
49. Identify applications for a servo motor
50. Identify applications for a series-wound motor
51. Identify applications for a shunt-wound motor
52. Identify applications for a capacitor start motor

I. Apply Fundamentals of Alternating Current
1. Convert between root mean square (RMS) and peak, and peak to peak
2. Compute instantaneous sine voltage values
3. Compute period
4. Compute wavelength
5. Draw a sine-wave cycle
6. Compute AC cycle instantaneous current values
7. Compute AC cycle instantaneous voltage values
8. Distinguish between a generator and an alternator
9. Identify generator components
10. Identify kinds of inductors
11. Determine transformer ratios
12. Compute the applied voltage in a series RL circuit
13. Compute the impedance in a series RL circuit
14. Compute inductive reactance
15. Compute applied voltage of an RL circuit
16. Compute impedance of an RL circuit
17. Compute power in a reactive circuit
18. Compute the Q of inductors
19. Solve time constant problems
20. Show the effect of inductance in an AC circuit
21. Solve for values of an operating RL circuit
22. Measure the value of inductance in a circuit
23. Compute capacitance values
24. Test capacitors with an Ohmmeter
25. Examine the construction of a capacitor
26. Determine the effect of AC and DC on a capacitor
27. Measure the value of a capacitor
28. Compute RC time constants
29. Determine time constants of RC circuits
30. Construct a neon bulb flasher
31. Compute the applied voltage, impedance and power factor of an RC circuit when given the resistive voltage, the capacative voltage and the current
32. Compute capacative resistance
33. Compute values of RC circuits
34. Determine phase relationships in RC circuits
35. Determine capacative reactance in RC circuits
36. Determine impedance in RC circuits
37. Show the effect of capacative reactance in AC circuits

38. Solve for reactance in a series RCL circuit
39. Solve for impedance in a series RCL circuit
40. Solve for parameters of resonant circuits
41. Determine resonance in a series RCL circuit
42. Analyze a parallel resonant circuit
43. Determine the resonant frequency of an RCL parallel circuit

J. Examine The Nature of Matter & The P-N Junction
1. Perform static test on semi-conductor diodes
2. Plot characteristic curves

K. Examine Rectifiers
1. Calculate average DC voltage
2. Draw current flow in a specified rectifier
3. Construct and test a half-wave rectifier circuit
4. Construct and test a full-wave rectifier circuit
5. Construct and test a voltage doubler circuit

L. Examine Filters
1. Calculate ripple factor and percent regulation
2. Construct and test a capacitor filter circuit
3. Construct and test a Pi-section filter circuit

M. Examine Semi-Conductor Diodes
1. Construct a volt/ampere characteristic curve for a zener diode
2. Construct and test a zener diode voltage regulator

N. Examine Transistors
1. Label a transistor circuit
2. Test transistors

O. Examine Bipolar-Junction Transistor Circuits
1. Compute stage gain in decibels
2. Construct and test a common-emitter circuit
3. Construct and test a common-base circuit
4. Construct and test a common-collector circuit
5. Plot a transistor output characteristic curve

P. Examine Transistor Amplifiers
1. Test a single-ended amplifier
2. Test a push-pull amplifier
3. Test a two stage amplifier
4. Test a Darlington- ir amplifier
5. Test a Servo-bridge amplifier

Q. Examine Operational Amplifiers
1. Calculate closed-loop gain
2. Calculate output voltage
3. Construct and test an inverting amplifier
4. Construct and test a noninverting amplifier
5. Construct and test a DC summing inverting amplifier
6. Construct and test a differential amplifier
7. Construct and test a Norton amplifier

R. Examine Logic Devices
   1. Construct and test an IC "AND" gate circuit
   2. Construct and test an IC "OR" gate circuit
   3. Construct and test an IC "NAND" gate circuit
   4. Construct and test an IC "Exclusive-OR" gate circuit
   5. Construct and test a diode "AND" gate circuit
   6. Construct and test a diode-transistor "NOR" gate circuit

S. Examine Logic Systems
   1. Convert decimals to BCD, to hexidecimal, and to octal
   2. Add and subtract binary numbers
   3. Construct and test a shift register

T. Examine Special Semi-Conductor Devices
   1. Construct and test silicon-controlled rectifier circuits
   2. Construct and test an unijunction transistor relaxation oscillator
   3. Construct and test a field-effect transistor amplifier
   4. Construct and test a thermistor-control circuit
   5. Construct and test an LED circuit
   6. Construct and test a metal oxide device
   7. Construct and test an insulated gate device

U. Examine Oscillators
   1. Construct and test a crystal oscillator
   2. Construct and test a Hartley oscillator

V. Examine Transmitters
   1. Calculate wave length
   2. Calculate antenna length
   3. Calculate standing wave ratio
   4. Calculate coaxial cable loss

W. Examine Receivers
   1. Identify and locate the major stages of AM mono receivers
   2. Identify and locate the major stages of AM stereo receivers
   3. Identify and locate the major stages of FM mono receivers
   4. Identify and locate the major stages of FM stereo receivers

X. Examine Electron Tubes
   1. Construct and test a vacuum tube diode circuit
   2. Construct and test a vacuum tube triode circuit

Y. Examine Microwaves
   1. Identify microwave bands and their use
   2. Identify Klystron components and their use
   3. Identify wave guide components and their use
   4. Identify antenna system components and their use
   5. Identify traveling wave tube components and their use
   6. Distinguish between RF and microwave transmission
   7. Identify applications of microwave technology

2. Examine Computers
    1. Identify types of computers
    2. Distinguish between hardware and software
    3. Identify computer components
    4. Define units of information
    5. Define character codes
    6. Define memory addresses
    7. Define memory size
    8. Define units of computer time
    9. Identify applications for real world interfacing

II. ELECTRONICS TECHNICIAN
  A. Demonstrate Basic Skills
    1. Operate electric drill
    2. Operate electric screwdriver
    3. Operate soldering devices
    4. Operate stripper
    5. Operate sidecutter
    6. Operate needlenose
    7. Terminate wire connectors
    8. Terminate cable connectors
    9. Terminate coaxial connectors
    10. Visually inspect electronic devices
    11. Clean electronic devices
    12. Lubricate electro-mechanical devices
    13. Calibrate electronic devices
    14. Keep records on maintenance of equipment
    15. Prepare parts lists
    16. Interpret technical reports
    17. Write technical reports
    18. Perform troubleshooting procedures

  B. Operate Basic Test Equipment
    1. Use multimeter
    2. Use oscilloscope
    3. Use signal generator
    4. Use frequency counter
    5. Use capacitor tester
    6. Use inductance tester
    7. Use laboratory power supply
    8. Use logic probe

  C. Work with DC Electronics
    1. Analyze meter movements
    2. Calculate values in DC network circuits
    3. Analyze problem DC circuits

  D. Work with AC Electronics
    1. Measure AC values in a circuit
    2. Compute turns in a transformer
    3. Compute voltage in a transformer
    4. Compute current in a transformer
    5. Compute impedance ratio in a transformer
    6. Analyze problem AC circuits

E. Analyze Problem Circuits
   1. Analyze circuits containing vacuum tubes
   2. Analyze circuits containing transistors
   3. Analyze circuits containing diodes
   4. Analyze circuits containing field effect transistor (FET)
   5. Analyze circuits containing silicon controlled rectifier (SCR)
   6. Analyze circuits containing TRIAC
   7. Analyze circuits containing optoelectronic devices
   8. Analyze circuits containing linear integrated circuits
   9. Analyze circuits containing digital integrated circuits
   10. Analyze circuits containing large-scale integrated (LSI) circuits
   11. Analyze circuit containing thyristors

F. Repair Electronic Devices
   1. Repair vacuum tube amplifier
   2. Repair transistor amplifier
   3. Repair power supply
   4. Repair oscillator
   5. Repair counter circuit
   6. Repair pulse circuit
   7. Repair nonsinusoidal amplifier
   8. Repair AM receiver
   9. Repair AM transmitter
   10. Repair FM receiver
   11. Repair FM transmitter
   12. Repair pulse receiver
   13. Repair pulse transmitter
   14. Repair video display circuit
   15. Repair audio circuit
   16. Repair composite video display

G. Analyze Computers
   1. Draw a block diagram of a computer system
   2. Verify an inoperative subsystem
   3. Identify a ROM circuit from a schematic
   4. Identify a RAM circuit from a schematic
   5. Identify an EPROM circuit from a schematic
   6. Identify a PROM circuit from a schematic
   7. Identify a bubble memory circuit from a schematic
   8. Identify an I/O port from a schematic
   9. Identify a modem from a schematic
   10. Identify a CPU from a schematic
   11. Describe the operation and function of a ROM circuit
   12. Describe the operation and function of a RAM circuit
   13. Describe the operation and function of an EPROM circuit
   14. Describe the operation and function of a PROM circuit
   15. Describe the operation and function of a bubble memory circuit
   16. Describe the operation and function of an I/O port

17. Describe the operation and function of a modem
18. Describe the operation and function of a CPU
19. Describe the operation and function of an I/O device
20. Describe the operation and function of a peripheral unit
21. Analyze a ROM circuit
22. Analyze a RAM circuit
23. Analyze an EPROM circuit
24. Analyze a PROM circuit
25. Analyze a bubble memory circuit